JOURNAL
of the
American Veterinary Medical Association
Formerly AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Assn.)

H. Preston Hoskins, Secretary-Editor, 221 N. LaSalle St., Chicago, Ill.

J. C. FLYNN, Pres., Kansas City, Mo. M. JACOB, Treas., Knoxville, Tenn.

EXECUTIVE BOARD

CASSIUS WAY, Member-at-Large and Chairman
R. S. MACKELLAR, ex officio; J. C. FLYNN, ex officio
A. E. CAMERON, 1st District; E. P. ALTHOUSE, 2nd District
L. A. MERILLAT, 3rd District; WILLIAM MOORE, 4th District
H. C. H. KERNKAMP, 5th District; L. M. HURT, 6th District
C. H. HAYS, 7th District; L. J. ALLEN, 8th District
H. W. JAKEMAN, 9th District, O. V. BRUMLEY, 10th District

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions. Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXXXVIII, N. S. Vol. 41 JUNE, 1936 No. 6

GRADUATES

Last fall our twelve veterinary colleges reported 330 senior students enrolled for the year 1935-36. It is too early to predict how many of these will be graduated at the commencement exercises this year, but it is fairly safe to say that the number will fall below the 300 mark. In any event, the number of graduates for 1936 will not be very far away from the estimated number needed for replacements. It will be recalled that the A. V. M. A. Committee on Education, in 1930, estimated that 296 new veterinarians per year would be required to maintain the numerical strength of the profession at a constant level over a 50-year period (1930-1980). For the five years from 1931 to 1935, the number of graduates was 1,379, or about 278 per year. The number this year will not be far from the average for the past five years.

This year there will be three colleges (Colorado, Iowa and Kansas) to turn out graduates who were required to have a year of pre-veterinary work. Last year there was only one (Iowa). These five-year men go out better equipped to fight life's battles than any of their predecessors and it is rather

difficult to appreciate the advancement that has taken place in veterinary education in comparatively recent years, when we recall that many men are still actively engaged in practice and other lines of work, who had the benefit of only two short terms of about six months each as their veterinary college training.

SENATORS DISCUSS CANNED DOG FOODS

Well, Senator L. J. Dickinson, of Iowa, certainly put the canned dog food industry on the front page for several days during the latter part of April. Just how much damage or how much good he did the industry can not be estimated at this time, but any temporary damage may possibly be offset later on, if Congress should decide to pass legislation requiring veterinary inspection of all dog foods entering interstate commerce.

The amusing part of the Senate episode is that Mr. Dickinson apparently had no particular reason to come to the aid of the badly bewildered dog food industry. Canned dog foods were merely a convenient means to a political end. He chastised the administration for certain alleged shortcomings and wrongdoings, which had resulted in causing many people to eat canned dog food, to the extent of a million pounds a year, more or less, during the depression.

Senator Dickinson, according to press reports, contended that this dog food, consumed by human beings incident to the "planned scarcity" of the New Deal, was "unfit even for dogs to eat!" Well, this information probably startled just about everybody but veterinarians. Most members of the profession have known for some time that a large part of the canned dog food sold in this country is not only not what it is represented to be, but it is actually harmful. There is one widely advertised brand that is so bad that it causes dogs to develop a chain of symptoms that are readily recognized by veterinarians practicing in the territory where this brand enjoys a large sale.

In the light of our present knowledge it would appear to have been a tactical error for the manufacturers of certain dog foods to advertise that their products were "fit for human consumption." It now looks as though this may have been a boomerang, as Senator Dickinson quoted at length from testimony given by L. J. Becker, former secretary of the late National Dog Food Manufacturers' Association, who estimated that 20 per cent of the total output of canned dog foods in the United States was consumed by human beings.

On the other hand, the whole affair may be a blessing in disguise, as far as the dog food industry is concerned. If Congress should decide to put dog food under federal meat inspection regulations, it would be the best thing that could happen. The small group of ethical manufacturers of wholesome products would be freed of the unfair competition of the horde of racketeers and chiselers who have been a blight on the dog food industry ever since its inception. Dogs are protected against the dangers of worthless or impure biological products. Why not give their food supply the same official supervision?

Rather facetiously, Senator James F. Byrnes, of South Carolina, suggested that "there could be no more burning issue than dog food" in the coming campaign. However, he conceded that "the real issue is not canned food but canned speeches." Our senators simply must have their little flings.

PROFESSOR HOBDAY TO BE RETIRED

The London *Times* recently stated that the impending retirement of Professor Sir Frederick Hobday, as Principal of the Royal Veterinary College, by reason of his reaching the age limit, is causing the Governors of the College considerable concern, as it will mean the selection of a successor to Sir Frederick at a very critical time in the history of the veterinary profession in England.

It is expected that the new buildings of the Royal Veterinary College will be completed within the next year. The responsibility of equipping and staffing the new buildings will fall upon the shoulders of the new Principal, and, in the opinion of the *Times*, his powers of organization and of administration will determine, to a very large extent, the efficiency of the veterinary profession in the future.

The *Times* states that the Governors are seeking a new charter from the Privy Council under which will be formed a new Court of Governors and a new Council. The new governing body will be faced with the task of appointing a successor to Sir Frederick. The latter, it is reported, will remain in office until the opening of the new buildings, but he will go on leave, as of October 1, in order that his successor may be free to organize the institution for which he will be responsible in the future.

Professor Hobday has worked long and faithfully over the plans for the new buildings, and the Governors feel that his con-

nection with the College should not be terminated until the new buildings are completed and formally opened. Considerable money is needed for equipment and maintenance.

EXECUTIVE BOARD ELECTIONS

The elections now in progress in two Executive Board districts will come to a close on June 13. More than the usual interest has been shown in these elections, due to the fact that active campaigns in behalf of at least one nominee in each district have been waged by friends of these candidates.

District 6 consists of California, Nevada, Utah, Colorado, New Mexico, Arizona, Mexico, Central America and the Canal Zone. The Golden State has four candidates on the ballot, which means that the large California vote will be more or less split up. The fifth candidate is from Colorado.

District 8 consists of Kansas, Missouri, Oklahoma, Arkansas, Texas and Louisiana. In this district the five nominees are from four states, Oklahoma having two, Kansas one, Missouri one and Texas one. However, Dr. C. C. Hisel has announced his withdrawal from the race in favor of the other candidate from Oklahoma, Dr. L. J. Allen.

The question has been raised as to the necessity for keeping the polls open for two months in all Executive Board elections, special and regular. The reason for this is to allow time enough for members in the Philippines (a part of Executive Board District 7) to cast their ballots. Experience has shown that about 90 per cent of the voting is done during the first month that the polls are open.

COLUMBUS AN INDUSTRIAL HUB

A. V. M. A. members who are making plans to attend the convention in Columbus, August 11-14, will find there a city of pioneer spirit and modern business progress and achievement. Manufacturing, distribution and transportation are important economic activities that have contributed to the advancement of Columbus as an industrial hub. The production and shipment of farm and food products, the growth of the packing industry and the flourishing of the shoe industry, all indicate the rapid and substantial progress of this city.

Oil derricks from Columbus are supplied to every important oil field in the nation, and aviation beacons made in the Ohio capital

light the way of planes on American and transcontinental flights. Automobiles coming into the city on the many important highways leading to this point travel on roads which have been improved by road-building machinery manufactured here. Roller bearings and other automotive parts are shipped from Columbus to all the leading automobile manufacturers. Columbus is a very important economic factor of the East North Central States which, with less than 21 per cent of the population, produce over 30 per cent of the goods manufactured in the United States.

Attend the convention in August and personally view the modern panorama of this great city.

DOCTOR MURRAY ACTING DEAN

The appointment of Dr. Charles Murray as acting dean of the Division of Veterinary Medicine at Iowa State College, effective May 15, was approved by the Iowa State Board of Education on May 28, in executive session at Cedar Falls. Dr. Murray will serve also as acting director of the Veterinary Research Institute.

Dr. Murray is a graduate of Iowa State College (B. S., 1910; D. V. M., 1912) and has been connected with the institution since 1908. Before going to Ames, he attended Drake University and received the Bachelor of Pedagogy degree in 1906. In 1917 he was appointed head of the Department of Veterinary Research and has been in direct charge of veterinary research work at Ames ever since.

NEW VETERINARY LABORATORY BUILDING FOR CORNELL

The New York State Legislature, at the recent session, appropriated $284,000 to the New York State Veterinary College at Cornell University for a new laboratory building. According to Dean Hagan, plans are now being prepared and it is expected that actual construction will be under way late this fall, or early in the spring of 1937, at the latest.

The new building will house the Department of Pathology and Bacteriology. It will be L-shaped, will stand next to James Law Hall, facing in the same direction as the main building, and will be three stories in height. The top floor will be devoted to work in bacteriology, the back wing containing an animal-room. The second floor will be given over to work in pathology, and will

contain a museum, a large class-room and a number of laboratories. On the first floor will be the diagnostic laboratories, both general and poultry, offices and a class-room. The basement will house garages and box-stalls for large animals. A large autopsy room will be attached to the rear of the building, and will be provided with ample refrigerating space for carcasses of large animals.

The appropriation will not be sufficient to equip the building. The Legislature will be asked to provide funds for this purpose later. The addition of this new unit to the veterinary institution at Ithaca is most welcome, as it will provide modern facilities for teaching and research work in the important fundamental subjects of pathology and bacteriology, so well grounded by the late Dr. Veranus A. Moore and now being carried forward so well by his successor, Dr. William A. Hagan. No appropriation made at Albany this year has the potentialities for greater dividends to the Empire State than the one for the new veterinary building at Ithaca.

APPLICATIONS FOR MEMBERSHIP

(See January, 1936, JOURNAL)

FIRST LISTING

CARLIN, LT. MAX H. 569 E. 106th St., Cleveland, Ohio
D. V. M., Ohio State University, 1935
Vouchers: W. F. Guard and Walter R. Hobbs.

COTTINGHAM, JAY 321 Federal Bldg., Salt Lake City, Utah
D. V. M., Saint Joseph Veterinary College, 1923
Vouchers: D. E. Madsen and Osborne G. Larsen.

FERGUSON, LLOYD C. 607 W. Johnson St., Madison, Wis.
D. V. M., Ohio State University, 1934
Vouchers: F. B. Hadley and James S. Healy.

KOUDELKA, THOMAS P. 1102 State Office Bldg., Richmond, Va.
D. V. M., Ohio State University, 1935
Vouchers: A. J. Sipos and R. E. Brookbank.

MILLENBRUCK, LT. EDWIN L. Fort Bragg, N. C.
D. V. M., Kansas State College, 1935
Vouchers: A. A. Husman and V. B. Wright.

NOWLIN, HUBERT A. University Station, Gainesville, Fla.
D. V. M., Alabama Polytechnic Institute, 1934
Vouchers: D. A. Sanders and M. W. Emmel.

ORR, NORTON A. Box 171, Fillmore, Utah
D. V. M., Colorado State College, 1933
Vouchers: Maj. John W. Miner and I. E. Newsom.

PRENTICE, CARL M. 115 Duane St., Clyde, Ohio
D. V. M., Ohio State University, 1912
Vouchers: W. F. Guard and Walter R. Hobbs.

PRITCHARD, CLARE W. 3315 N. 24th St., Tacoma, Wash.
B. S., D. V. M., State College of Washington, 1932
Vouchers: C. E. Sawyer and C. M. Hamilton.

SIMONSON, EARL M. Hooper, Nebr.
A. B., University of Nebraska
D. V. M., Ohio State University, 1935
Vouchers: Walter R. Krill and W. F. Guard.

STRAKER, JOE H. 201 E. Third St., Greenville, Ohio
D. V. M., Ohio State University, 1933
Vouchers: H. H. Fairbank and W. F. Guard.

TUCKER, GLENN A. Vista, Calif.
D. V. M., Kansas City Veterinary College, 1911
Vouchers: L. K. Knighton and E. F. Sheffield.

Applications Pending

SECOND LISTING

(See May, 1936, JOURNAL)

Anderson, Grant W., Clemson College, Clemson, S. C.
Bamber, Samuel D., Van Kirk Apts., Herkimer, N. Y.
Bowen, William C., Richwood, Ohio.
Collins, Lt. William F., Fort Sill, Okla.
Compton, Lyle S., S. Center St., Clymer, N. Y.
Court, Maurice J., Lowell, Mich.
Dannley, George R., 233 Maple St., Ashland, Ohio.
Douglass, Arden H., Union Stock Yards, Los Angeles, Calif.
Epperson, Marvin E., 620 N. Market St., Galion, Ohio.
Evans, Robley, 239 E. Main St., New Holland, Pa.
Evans, Lt. Tom, Hdqrs. CCC, Albuquerque, N. M.
Firth, Lendall K., 50 E. Buchtel Ave., Akron, Ohio.
Gibson, Bernard H., Newark, Ohio.
Hickey, James C., Pine Forge, Pa.
Kutsher, Lincoln G., 2 Ash Dr., Great Neck, L. I., N. Y.
Leenerts, Lt. Theodore H., Presidio of San Francisco, San Francisco, Calif.
McClarren, Robert L., 1957 E. Main St., Columbus, Ohio.
McMichael, Lt. William W., 3712 Bisbee St., El Paso, Texas.
Madden, Anson G., Madeira, Ohio.
Manges, Lt. Joseph D., Courtland, Kans.
Marchand, George U., 526 Walnut St., Uhrichsville, Ohio.
Merritt, Lloyd C., Sumter, S. C.
Meyer, Josh F., Gardner, Colo.
Morrill, Charles C., Kansas State College, Manhattan, Kans.
Parker, Robert M., DeFuniak Springs, Fla.
Rooks, Elmer L., 343 N. Fifth St., Greenfield, Ohio.
Russell, Foster D., Presho, S. Dak.
Scothorn, Marion W., Ashville, Ohio.
Siemer, Lt. Everett J., Hdqrs. CCC, Silver City, N. M.
Stafford, Charles D., Novato, Calif.
Taylor, Stanley E., 241 Lexington Ave., Mansfield, Ohio.
Thrash, Ai C., Lost Creek, W. Va.
Weller, Robert R., R. 5, Box 627-A, Tacoma, Wash.
Wiseman, Orville G., 15717 Brewster Rd., East Cleveland, Ohio.

The amount which should accompany an application filed this month is $7.91, which covers membership fee and dues to January 1, 1937, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

Central New York Veterinary Medical Association. Genoa, N. Y. June 3, 1936. Dr. W. B. Switzer, Secretary, R. 5, Oswego, N. Y.

Houston Veterinary Association. Houston, Texas. June 4, 1936. Dr. D. B. Strickler, Secretary, 317 Federal Bldg., Houston, Texas.

Mississippi Valley Veterinary Medical Association. Williams Sale and Commission Building, 2220-36 S. Washington St., Peoria, Ill. June 4, 1936. Dr. Lyle A. Gray, Secretary, Bushnell, Ill.

East Tennessee Veterinary Medical Society. White Surgical Supply Building, Knoxville, Tenn. June 6, 1936. Dr. Robert L. Hummer, Secretary, 312 W. Church Ave., Knoxville, Tenn.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. June 10, 1936. Dr. F. D. Egan, Secretary, 17422 Woodward Ave., Detroit, Mich.

Northeastern Indiana Veterinary Medical Association. Tri-Lakes, Ind. June 14, 1936. Dr. H. O. Elliott, Secretary, Box 178, Orland, Ind.

Arkansas Veterinary Medical Association. Mountain Inn Hotel, Fayetteville, Ark. June 15-16, 1936. Dr. T. M. Dick, Secretary, City Hall, Little Rock, Ark.

Oklahoma Veterinary Medical Association. (Joint meeting with the Arkansas Veterinary Medical Association.) Fayetteville, Ark. June 15-16, 1936. Dr. C. H. Fauks, Secretary, 1719 S. W. 15th St., Oklahoma City, Okla.

Chicago Veterinary Medical Association. Palmer House, Chicago, Ill. June 16, 1936. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.

Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. June 16, 1936. Dr. C. C. Foulk, Secretary, 1103 E. 47th St., Kansas City, Mo.

American Association for the Advancement of Science. Rochester, N. Y. June 16-18, 1936. Dr. Henry B. Ward, Secretary, Smithsonian Institution Bldg., Washington, D. C.

Eastern Iowa Veterinary Association, Inc. Mechanicsville, Iowa. June 17, 1936. Dr. John J. Strandberg, Secretary, 1005 8th Ave., Belle Plaine, Iowa.

Southern California Veterinary Medical Association. Chamber of Commerce, Los Angeles, Calif. June 17, 1936. Dr. L. E. Pike, Secretary, 1220 Bennett Ave., Long Beach, Calif.

Idaho Veterinary Medical Association. Twin Falls, Idaho. June 22-23, 1936. Dr. E. M. Gildow, Secretary, University of Idaho, Moscow, Idaho.

California State Veterinary Medical Association. Del Monte, Calif. June 22-24, 1936. Dr. Cliff D. Carpenter, Secretary, 337 Central Ave., Los Angeles, Calif.

Michigan State Veterinary Medical Association. Michigan State College, East Lansing, Mich. June 23-24, 1936. Dr. Lloyd B. Sholl, Secretary, 810 Sunset Ave., East Lansing, Mich.

Missouri Veterinary Medical Association. Carthage, Mo. June 23-24, 1936. Dr. Ashe Lockhart, Secretary, 800 Woodswether Rd., Kansas City, Mo.

Vermont Veterinary Medical Association. Burlington, Vt. June 26-27, 1936. Dr. G. N. Welch, Secretary, 43 Union St., Northfield, Vt.

Northwestern Ohio Veterinary Medical Association. Tiffin, Ohio. June 28, 1936. Dr. Warren P. S. Hall, Secretary, Division of Health, 9 Ontario St., Toledo, Ohio.

Wisconsin Veterinary Medical Association. Spider Lake Resort, Manitowish, Wis. June 29-30, 1936. Dr. B. A. Beach, Secretary, University of Wisconsin, Madison, Wis.

South Carolina Association of Veterinarians. Claremont Hotel, Sumter, S. C. July 6-7, 1936. Dr. R. A. Mays, Secretary, 408-410 State Office Bldg., Columbia, S. C.

Northwest Veterinary Medical Association. (Joint meeting of the Oregon, Washington and British Columbia Veterinary Medical associations.) Winthrop Hotel, Tacoma, Wash. July 6-8, 1936. Dr. Cliff. Ackley, Secretary, 1610 Market St., Chehalis, Wash.

North Carolina State Veterinary Medical Association. Goldsboro, N. C. July 7-8, 1936. Dr. J. H. Brown, Secretary, Tarboro, N. C.

Minnesota State Veterinary Medical Society and University of Minnesota Short Course for Veterinarians. University Farm, Saint Paul, Minn. July 9-10, 1936. Dr. C. P. Fitch, Secretary, University Farm, Saint Paul, Minn.

New Jersey, Veterinary Medical Association of. Hotel Monterey, Asbury Park, N. J. July 9-10, 1936. Dr. John G. Hardenbergh, Secretary pro tem., c/o Walker-Gordon Laboratory Co., Plainsboro, N. J.

Virginia State Veterinary Medical Association. Virginia Polytechnic Institute, Richmond, Va. July 9-10, 1936. Dr. A. J. Sipos, Secretary, 1102 State Office Bldg., Richmond, Va.

Ak-Sar-Ben Veterinary Medical Association. Elks Building, Omaha, Neb. July 13, 1936. Dr. J. N. McIlnay, Secretary, 3251 Leavenworth St., Omaha, Neb.

Maine Veterinary Medical Association. Sanford, Me. July 16, 1936. Dr. S. W. Stiles, Secretary, Falmouth Foreside, Me.

New York State Veterinary Medical Society. Hotel Lafayette, Buffalo, N. Y. July 16-17, 1936. Dr. F. F. Fehr, Secretary, 243 S. Elmwood Ave., Buffalo, N. Y.

Montana Veterinary Medical Association. Kalispell, Mont. July 23-24, 1936. Dr. Hadleigh Marsh, Secretary, Agricultural Experiment Station, Bozeman, Mont.

Western Michigan Veterinary Medical Association. Ionia Fair Grounds, Ionia, Mich. July 30, 1936. Dr. C. H. Haasjes, Secretary, 728 S. State St., Shelby, Mich.

American Veterinary Medical Association. Deshler-Wallick Hotel, Columbus, Ohio. August 11-14, 1936. Dr. H. Preston Hoskins, Secretary, 221 N. La Salle St., Chicago, Ill.

STATE BOARD EXAMINATIONS

Iowa Veterinary Medical Examining Board. State Capitol, Des Moines, Iowa. June 16-17, 1936. Further information may be obtained from the Secretary. Dr. H. A. Seidell, Secretary, State Capitol, Des Moines, Iowa.

Pennsylvania State Board of Veterinary Medical Examiners. School of Veterinary Medicine, 39th St. and Woodland Ave., Philadelphia, Pa. June 11-12, 1936. Applications may be obtained from the Secretary. Dr. H. W. Barnard, Secretary, 375 Education Bldg., Harrisburg, Pa.

Nebraska Bureau of Examining Boards. State House, Lincoln Neb. June 29-30, 1936. Applications must be on file at the Bureau not later than 15 days prior to date of examination. Mrs. Clark Perkins, Director, Bureau of Examining Boards, State House, Lincoln, Neb.

Massachusetts Board of Registration in Veterinary Medicine. Department of Civil Service and Registration, Boston, Mass. June 30-July 1, 1936. Applications may be obtained from the Secretary. Dr. E. W. Babson, Secretary, Gloucester, Mass.

GASTRO-ENTERITIS IN DOGS*

By JAMES B. HARRISON, *Portland, Ore.*

Discussion of the subject of gastro-enteritis covers a number of different conditions and is one of the most important phases of small-animal practice, constituting a large percentage of our cases. It may occur primarily, or it may be associated with nephritis, hepatitis, or other organic diseases.

Marked progress has been made in the treatment in the last five years. Cases that were then thought practically hopeless, we are now able to bring to an uneventful recovery. The most important phase of treatment is proper diagnosis. Some of us are careless at times in examinations, if we are pressed for time, or the visual picture seems to indicate some certain condition.

EXAMINATION OF PATIENT

After getting the history, it should be routine in every case to take the temperature and examine the eyes for congestion, expression and discharge. Examine the mucous membranes for color, injuries and infection. A pale, anemic color suggests the possibility of hookworm or whipworm infestation. Congestion suggests toxemia and paleness may be due to internal hemorrhage. Palpate the abdomen for sensitiveness, foreign bodies, intussusception, obstipation, or any other abnormal condition. Then take the pulse (which I consider most important in differential diagnosis). Next examine the feces for color, character, odor and quantity. After this, make a microscopic examination for parasite eggs, coccidia, amoebae, salmon fluke eggs and the presence of blood. Also examine the urine for color, sugar, casts, cells and indican.

In some cases it is necessary to use the fluoroscope or x-ray, where there are symptoms of foreign bodies being present in the intestinal tract. At times a blood examination is indicated.

We commonly see acute gastric catarrh associated with enteritis caused by faulty feeding, spoiled foods, metallic poisons, salmon poisoning, distemper, or typhus. The sudden onset of this, however, may result from chronic diseases of other organs.

Vomiting occurs early and is a most prominent symptom. First, undigested food is vomited, followed by watery fluids sometimes streaked with blood. If the vomitus is green or yellowish, the bile-duct is involved.

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, Oklahoma City, Okla., August 27-30, 1935.

The mucosa of the mouth is dry and the tongue is coated, the mouth having a fetid odor. Temperature ranges from 103 to 105° F., which, in later stages may drop to below 100.

Showing mild to intense abdominal pain, the patient is very reluctant to move, even weak. The appetite is variable, some cases drinking excessive amounts of water, which is usually vomited.

Acute dilatation of the stomach is caused by overloading with food or by gas formation. If it is gas, you may get a bilateral tympanites, with percussion, more intense on the left side, accelerated respiration, even dyspnea, pounding of the heart and rapid pulse.

Obstipation is common in older dogs where they are fed dry foods and bones. This condition is caused also by tumors that affect the lumen of the bowels; also by enlarged prostate.

The animal manifests labor or pain on defecation, the stools are hard, sometimes streaked with blood, while at other times there is a thin stool. When this condition is of long standing, there is distress in the region of the rectum.

On rectal palpation, hard stool or bones can be detected. The animal shows restlessness and frequently attempts to empty the bowel; vomiting at times. As the case progresses, the animal's gait becomes impaired, at times arching the back. The temperature in acute cases is generally high. In chronic cases the temperature does not generally range so high as in the acute condition. When the prognosis is unfavorable, it may become subnormal, with pulse and respiration accelerated. Stenosis occurs, due to prostatitis, tumors, injuries, pressure due to dropsy, metritis and urinary retention.

Symptoms

The animal generally shows a loss of appetite, fecal passage has stopped or is very scant, and the dog becomes restless and howls or whines. The temperature is normal with pulse and respiration elevated, abdominal muscles tense, making the condition sometimes difficult to distinguish from foreign bodies.

Intussusception is believed to be due to irregular innervation, caused by superpurgation, parasites, or severe exercise. In this condition part of the bowel slips into another, forming a sausage-like mass of varied length. The symptoms are severe abdominal pain, with the animal lying on its back. Later, with symptoms of acute enteritis, the feces show the presence of blood. The temperature shows a slight rise, with rapid pulse and respiration.

Coccidiosis causes an enteritis, the severity depending upon the degree of infestation and the natural resistance of the individual.

The symptoms include a catarrhal diarrhea, in some cases becoming profuse and bloody. Emaciation, depression and weakness predominate in severe cases. The temperature may be slightly elevated. The mucosa is pale and there may be a grayish discharge from the eyes. In some cases, muscular tremors are observed.

The most noticeable lesions are acute hemorrhages, ulcerative enteritis with epithelium being destroyed. In some cases there is such great destruction of epithelium that even though the patient lives, it is not able to assimilate food properly, and remains emaciated, and recovery is incomplete. We are most concerned with this in racing greyhounds, as the condition may make them useless for part or all of a racing season. As the average greyhound is at its best for only two or three seasons, this is a most serious disease. It is very likely to affect a great percentage of the young animals brought to the tracks each year.

The clinical symptoms of amebic dysentery appear similar to coccidiosis and may be easily mistaken for coccidiosis. However, in amebic dysentery the temperature is higher and there is greater abdominal pain, with vomiting in some cases. Also differing from coccidiosis, the mortality rate is much higher.

The appetite is variable. There is an intermittent diarrhea, profuse and bloody at times. The only positive diagnosis for this condition is a microscopic fecal examination. The examination must be made as soon as the sample is taken and on a warm slide.

Salmon poisoning is a condition found only on the Oregon coast, in the southern part of Washington, and in the northern part of California. The symptoms first appear 7 to 14 days after the dog has eaten fish infected with the parasite. The animal refuses to eat, runs a high temperature of 104 to 106° F. which drops to subnormal as the condition progresses. Vomiting occurs and the vomitus may be tinged with blood. Then diarrhea develops, which becomes more bloody as the condition progresses.

Microscopic examination of the feces will show the presence of a great number of fluke eggs, but they are not constant in the course of the disease, since ovulation of the fluke is not continuous.

Typhus is characterized by severe stomatitis and a catarrhal gastro-enteritis. This disease has a characteristic odor and is easily diagnosed. Typhus is very common in the South but is seldom seen in the Northwest.

Treatment

The first thing in the treatment of most gastro-enteritis cases is an enema. If the patient is weak, give a low, warm, soda enema, but if the patient is strong we usually give a high enema. Following this, we give a normal saline injection subcutaneously, 100 to 200 cc, depending on the size of the patient. This procedure is repeated two or three times daily. In most cases the intestinal tract is given a complete rest of 24 hours with not a thing given orally. There are probably more dogs killed by administering drugs orally than are saved by this method.

We give 5 to 10 cc of 50 per cent dextrose intravenously, and repeat once or twice daily. We previously gave larger doses and ran some tests and found that we were not only wasting the dextrose, but were causing an acidosis and hindering the recovery of the patient.

After giving the intestinal tract a 24-hour rest, we give one-half teaspoonful of Metamucil (Searle) in a half-cup of cold water. Metamucil is a vegetable mucilloid prepared from *Plantago ovata* and held in suspension with a specially prepared milk powder. This preparation is slightly antacid and has absorbent properties. In the intestinal tract it provides the lubricant properties of normal secretions and helps to produce intestinal tone which is usually lacking. It also tends to check diarrhea.

In some cases we use Kaomagma (Wyeth). In hemorrhagic gastro-enteritis a 1 per cent salt solution is given orally. Increased thirst indicates body alkalinity, in which case a weak HCl solution should be given. Lack of thirst indicates high body acidity, in which case antacids are indicated.

Keep the patient warm with heat-pads, water-bottles or blankets. In very severe cases blood transfusions are resorted to, usually a direct transfusion being given.

The most important thing to keep in mind is that, in all gastro-enteritis cases, we have a dehydration of the body to a greater or lesser extent and replacing the water content does more to correct this condition, as well as to eliminate toxins, than any other treatment. It will stop vomiting in a large number of cases. Atropine in 1/150-grain doses is indicated in some cases, and morphine is used in cases where there is great pain. The only time the use of saline is contraindicated is when pneumonia is present.

We wash the mouth three times daily with a sodium perborate solution. When diarrhea persists, we give intravenous injections of 5 or 10 per cent gelatin solution, as well as tannic acid enemas.

In acute dilatation we give apomorphine and empty the stomach. In very severe cases, where the patients are having difficulty breathing, due to gas, we trocarize them.

In obstipations we use soda enemas and the fecal forceps to break up the masses, which may have to be done by allowing the patient to rest for a time after an enema of mineral oil is given. After the intestinal tract is opened up, the patient should be given only liquid foods and Metamucil for several days, until the intestines recover their tone. Mineral oil should be continued for a period of a week or more.

Intussusception may be relieved by enemas and abdominal palpation, but if this does not relieve the condition, it will be necessary to do a laparotomy. If the condition is of some duration, it may be necessary to do an intestinal anastamosis.

In the treatment for coccidiosis, we put the patient on buttermilk with regular food. Then we give an intestinal astringent. In the severe cases tannic acid enemas are given. Other than this the cases are treated the same as any other gastro-enteritis case.

In the treatment of amebic dysentery, we use, in conjunction with the regular enteritis treatment, all the methods used in human practice for this disease. Emetine, in 1/5- to ¼-grain doses, is given at 3- to 5-day intervals. We also use carbarsone, in 2- to 5-grain doses, either daily or at 3-day intervals, but with very little success.

In salmon poisoning the mortality rate is very high and the regular treatment for enteritis is employed, with blood transfusions from hyperimmune dogs, 100 to 200 cc of blood being given by direct transfusions daily.

When the patient shows enough improvement to start feeding, we start with a liquid diet, using sweet milk or buttermilk, except in some cases where Karo syrup and egg yolks are added to the milk. This is followed by beef broth and slightly cooked beef.

The convalescing period is very important and the patient should be fed small amounts of easily digested food three or more times daily.

Of the approximately 20,000,000 Indians in the Western Hemisphere, only about 350,000 are said to be American Indians.

73rd Annual Convention A. V. M. A.
Columbus, Ohio, August 11-12-13-14

CANINE TYPHUS—AN ANEMIA OF DOGS*

By A. A. HERMANN, *Denver, Colo.*

Throughout a long and extensive practice in canine medicine, the disease called typhus, black tongue, hemorrhagic gastro-enteritis, etc., has been my major consideration in thought, study and observation. In the coming years my greatest desire is to continue this fascinating study to a logical conclusion.

Most of us have seen this disease erroneously diagnosed as arsenical or antimony poisoning, or ulceration from ingesting ground glass, which is relatively harmless. The dog-owner is very favorably impressed by a "ground glass" diagnosis and can imagine violent disturbances induced by its sharp edges, such as bloody vomitus and liquid, bloody feces, characteristic of typhus.

Observers and authors of texts have described it as an acute infectious disease. We have tried in every conceivable manner to transmit typhus by blood transfusions, by feeding necrotic tissues, and by kenneling healthy dogs with patients. We have submitted patients and autopsy specimens to such splendid, painstaking pathologists as Dr. I. E. Newsom and Dr. G. W. Stiles, and to diagnostic laboratories, but no causative organisms were found.

Recovery from most transmissible disease confers a degree of immunity sufficient to prevent a recurrence for a number of years. We have observed dogs with a serious attack of typhus every year for three successive years. During the experiments, an aggressin was prepared and given to dogs in exposed kennels and to patients, with neither deleterious nor beneficial effects. Blood transfusions from recovered cases have no greater beneficial effect than blood from normal, healthy dogs.

Many of the clinical manifestations are not unlike azoturia of horses: the bloody urine, the stiffness in the back, loins and hind legs, the paraplegia, the destruction of erythrocytes and other body tissues. Prolonged exertion or violent physical exercise may precipitate an attack. Prolonged fasting may also induce its appearance.

Typhus usually appears in older dogs within a year after recovery from distemper and cases which have this disease in a severe form will also suffer severely from typhus.

Before the liberal use of homologous serum became general, only the more benign cases of distemper recovered, so that poten-

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, Oklahoma City, Okla., August 27-30, 1935.

tial cases of typhus were less numerous. The filtrable virus of distemper evidently causes severe injury to the liver, spleen and red bone-marrow and inhibits their function of producing erythrocytes and hemoglobin in normal quantity. This inhibition, combined with artificial diets deficient in life-sustaining vitamins, makes the appearance of typhus inevitable and aggravated in severity.

For countless generations the dog's ancestors lived and thrived on a diet of raw natural foods rich in nutrients and essential vitamins. They lapped up the fresh blood, tore the carcass asunder and greedily ate the liver, spleen and other glandular structures and included even the small, splintery, sharp, but harmless, bones.

Now the major portion, if not the entire meal, is superheated in canning, or it consists of cooked, baked or fried leftovers, as unsuited, artificial and unnatural as possible for a carnivorous animal. Unfortunately many veterinarians become the thoughtless salesmen of these unnatural foods and by recommending them place the professional stamp of approval upon them.

Nature's storehouse of wholesome, natural, vitamin-rich foods is as abundant as ever. Dogs learn to relish the taste of raw liver, kidney, spleen, fresh and sun-dried fruits, raw rolled oats, wheat embryo, dairy products and salad vegetables, any of which may be added in small quantity to the main diet of raw meat or bones.

When through prolonged lack of vitamins the clinical manifestations of typhus appear, erythrocytes in enormous quantity disintegrate, flooding the system with bile and other by-products of red-cell destruction. Peristalsis is diminished or completely checked during the first 48 hours, to be followed later by a very foul-smelling excretion of blood, bile and mucus.

Rapid dehydration comes from inability to retain liquids long enough to absorb any and the loss of tissue fluids through the incessant vomiting of gastric juices, salivation, urination and excreta must be replaced by intravenous injections of 10 to 50 cc of sterile dextrose and 100 to 500 cc of normal saline solution, repeated at 24-hour intervals. Part should be given intravenously and a part intramuscularly. An enema is indicated only when the bowel is clogged with large masses of excreta.

All water should be withheld and buttermilk in small, oft-repeated quantities substituted therefore. We do not force the buttermilk on the patient but leave it convenient, and the majority take to it very nicely.

Yeast in every conceivable form has been given extensive trial and the fresh cake yeast (¼ to ½ cake every 6 hours) has been found to be more palatable, more potent and more easily tolerated by the patient's stomach than any other form.

When acute vomiting has abated, the patient is offered fresh, raw calf liver in small pieces. This is offered but not forced. Calf spleen, when procurable, is equally potent and palatable.

We have used pounds of dry powdered liver and pints of liver extract intramuscularly and intravenously with fair results but not comparable to the splendid results attained by the use of the raw calf liver or spleen. In larger dogs and mild cases we sometimes use adult beef liver, but judging by results consider the embryonic liver to be at least five times as potent as the adult liver.

The first consideration is to check the vomiting. We use 3 gr. bismuth, ½ gr. procaine, 1 gr. iron citrate, 1/100 gr. copper arsenite and 2 gr. salol, repeated at two- to four-hour intervals.

Referring to the anemia aspect of typhus, we note a steady decline in the hemoglobin content of the blood by observations on blood samples at 4-day intervals on the electrical Dare's hemoglobinometer. This decline continues for a month or longer, often becoming so pronounced that the readings are 50 or less, as compared with a normal of close to 120. When the hemoglobin drops below 70, serious interference with digestion is noted and the vomiting which has been checked for some time may reappear.

During the acute and initial appearance of typhus symptoms, a blood transfusion is contra-indicated but when symptoms of resultant anemia are evident, a couple of weeks later, a blood transfusion will be followed by a marked improvement.

Eastern Iowa Clinic to Have Eight Sections

The sixth annual practitioners' clinic of the Eastern Iowa Veterinary Association, Inc., to be held at Dr. Frank M. Wilson's veterinary hospital, Mechanicsville, Iowa, June 17, will be divided into eight sections: Horses, cattle, swine, sheep, pet animals, poultry, laboratory diagnosis and handy devices. A committee of prominent veterinarians is arranging a program for each section.

73rd Annual Convention A. V. M. A.
Columbus, Ohio, August 11-12-13-14

THE CARE AND TREATMENT OF CAGED BIRDS*

By CLIFF D. CARPENTER, *Los Angeles, Calif.*

Only within the last few years, have birds attracted the attention of the practicing veterinarian. To say that the average small-animal practitioner is sufficiently versed to serve bird-owners adequately would be a gross exaggeration of the facts. Few veterinary colleges as yet are ready to give sufficient instruction to undergraduates in this phase of veterinary medicine. The practitioner must, therefore, by experience and personal study, prepare himself for the work which our profession must plan to serve.

Such a recommendation is neither selfish nor ill advised. The owner of a beautiful, sweet-songed canary should expect the same consultation, the same surgery and the same hospitalization as though the subject were a dog, cat or other pet. Certainly this type of practice can become profitable to the practitioner who thus prepares himself with at least a superficial knowledge of the peculiarities of birds, their habits and food requirements.

Not much can be said for the medication of birds. It is doubtful if pneumonia, for example, is a serious canary disease; and, even if accurately diagnosed, it is questionable if other than proper feed and good nursing will be of much avail. Among bird-breeders, and owners of large aviaries, the expression is very common, that "once a sick bird, usually a dead bird." This is quite often the case if the circulatory or respiratory system be seriously involved. Obviously, in minor afflictions a favorable prognosis can be made. This pertains particularly to intestinal conditions in almost exactly the same manner as animals, but the veterinarian seldom sees these simple cases.

AVIAN PECULIARITIES

If the hospital-owner desires to prepare himself to serve his clients who own birds he must be familiar with some of the peculiarities of birds.

Generically, birds are reptilian—not mammalian. This fact alone gives rise to avian peculiarities not met with in mammalia. A high and variable temperature, for example, tells little or nothing in birds. Reproduction is entirely different, fertilization taking place in the uterus or oviduct, but the embryo develops and is hatched entirely outside the body. The first food supplied the bird after hatching is the remainder of the yolk from the

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, Oklahoma City, Okla., August 27-30, 1935.

Yeast in every conceivable form has been given extensive trial and the fresh cake yeast (¼ to ½ cake every 6 hours) has been found to be more palatable, more potent and more easily tolerated by the patient's stomach than any other form.

When acute vomiting has abated, the patient is offered fresh, raw calf liver in small pieces. This is offered but not forced. Calf spleen, when procurable, is equally potent and palatable.

We have used pounds of dry powdered liver and pints of liver extract intramuscularly and intravenously with fair results but not comparable to the splendid results attained by the use of the raw calf liver or spleen. In larger dogs and mild cases we sometimes use adult beef liver, but judging by results consider the embryonic liver to be at least five times as potent as the adult liver.

The first consideration is to check the vomiting. We use 3 gr. bismuth, ½ gr. procaine, 1 gr. iron citrate, 1/100 gr. copper arsenite and 2 gr. salol, repeated at two- to four-hour intervals.

Referring to the anemia aspect of typhus, we note a steady decline in the hemoglobin content of the blood by observations on blood samples at 4-day intervals on the electrical Dare's hemoglobinometer. This decline continues for a month or longer, often becoming so pronounced that the readings are 50 or less, as compared with a normal of close to 120. When the hemoglobin drops below 70, serious interference with digestion is noted and the vomiting which has been checked for some time may reappear.

During the acute and initial appearance of typhus symptoms, a blood transfusion is contra-indicated but when symptoms of resultant anemia are evident, a couple of weeks later, a blood transfusion will be followed by a marked improvement.

Eastern Iowa Clinic to Have Eight Sections

The sixth annual practitioners' clinic of the Eastern Iowa Veterinary Association, Inc., to be held at Dr. Frank M. Wilson's veterinary hospital, Mechanicsville, Iowa, June 17, will be divided into eight sections: Horses, cattle, swine, sheep, pet animals, poultry, laboratory diagnosis and handy devices. A committee of prominent veterinarians is arranging a program for each section.

73rd Annual Convention A. V. M. A.
Columbus, Ohio, August 11-12-13-14

THE CARE AND TREATMENT OF CAGED BIRDS*

By CLIFF D. CARPENTER, *Los Angeles, Calif.*

Only within the last few years, have birds attracted the attention of the practicing veterinarian. To say that the average small-animal practitioner is sufficiently versed to serve bird-owners adequately would be a gross exaggeration of the facts. Few veterinary colleges as yet are ready to give sufficient instruction to undergraduates in this phase of veterinary medicine. The practitioner must, therefore, by experience and personal study, prepare himself for the work which our profession must plan to serve.

Such a recommendation is neither selfish nor ill advised. The owner of a beautiful, sweet-songed canary should expect the same consultation, the same surgery and the same hospitalization as though the subject were a dog, cat or other pet. Certainly this type of practice can become profitable to the practitioner who thus prepares himself with at least a superficial knowledge of the peculiarities of birds, their habits and food requirements.

Not much can be said for the medication of birds. It is doubtful if pneumonia, for example, is a serious canary disease; and, even if accurately diagnosed, it is questionable if other than proper feed and good nursing will be of much avail. Among bird-breeders, and owners of large aviaries, the expression is very common, that "once a sick bird, usually a dead bird." This is quite often the case if the circulatory or respiratory system be seriously involved. Obviously, in minor afflictions a favorable prognosis can be made. This pertains particularly to intestinal conditions in almost exactly the same manner as animals, but the veterinarian seldom sees these simple cases.

AVIAN PECULIARITIES

If the hospital-owner desires to prepare himself to serve his clients who own birds he must be familiar with some of the peculiarities of birds.

Generically, birds are reptilian—not mammalian. This fact alone gives rise to avian peculiarities not met with in mammalia. A high and variable temperature, for example, tells little or nothing in birds. Reproduction is entirely different, fertilization taking place in the uterus or oviduct, but the embryo develops and is hatched entirely outside the body. The first food supplied the bird after hatching is the remainder of the yolk from the

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, Oklahoma City, Okla., August 27-30, 1935.

parent egg, the embryo requiring about 1/3 by weight of the yolk substance and the remaining 2/3 then becomes incorporated in the body cavity shortly before hatching and is absorbed directly into the intestine through a navel connection, taking from 72 to 96 hours for this to become completed. This peculiarity assures the young bird of rich, easily digestible food which otherwise it could not obtain for itself. This biological feature makes it possible to ship commercial baby chicks long distances without additional food or water.

Many parent birds feed their young until they leave their nest by first swallowing the food and then, after regurgitation, give it to their tiny offspring.

The largest bird in the world, the ostrich, does not fly. It weighs 300 pounds and stands 5 to 8 feet high. The smallest, the humming bird, is two inches long, weighs ½ to 1½ ounces, and moves it wings so rapidly that it can maintain a level position for several seconds while withdrawing sweets from a flower. It is the only bird that can fly backward.

Historically, birds have played some important rôles. The first air mail was *via* carrier pigeon. Successful war-waging has been dependent in a measure upon these same birds, in about the same manner as messenger dogs, and with less risk.

Economically, birds are a mighty factor in the life of man, because of their insect-feeding habits. Scientists have pondered over the possibility that insects drove man from the tropics, and followed him into the cooler regions as the great Ice Cap retreated, ever seeking to destroy his food, injure his health and make him miserable. There are over 300,000 described species of creeping, crawling and flying insects and probably an equal number unidentified.

In a large measure, birds are nature's balance to keep in check these insect hordes. Soft-billed birds, such as thrushes, mocking birds and robins (incidentally, robins were once a game bird), devour countless billions of these crop pests. The United States Department of Agriculture estimate that 10 per cent of our crops is lost annually to insect life. A hundred million dollar loss in trees annually is directly chargeable to the decreasing number of song birds.

A cricket plague in May, 1848, threatened to wipe out the struggling pioneer colony in Salt Lake City, then less than a year old. In countless numbers these crickets appeared down the mountain sides to devour nearly 1,000 acres of newly sprouted winter wheat that was to feed 1,800 inhabitants and 2,500 more who would join them before winter.

With brooms and clubs the pioneers attempted to beat back these invading hordes. They resorted to burning and flooding to drown them, but to no avail. As if by a miracle, band after band of sea gulls darkened the western sky. They fell upon these insects with military precision to such a satisfactory conclusion that enough of the crop was saved to prevent a disastrous winter famine.

Today, there stands in this modern intermountain city a monument dedicated to this victory of birds over pasasites. Offspring of these same birds are still to be found on the Lake Islands and it is a punishable offense to destroy one of them.

Bird Breeding Not Well Understood

Bird breeding and its attendant peculiarities are little understood by the veterinarian. Parrots seldom breed under present-day domestication unless given large secluded quarters. Finches by contrast are very prolific but even here they should be provided with seclusion, nesting material and disturbed as little as possible. Many a canary family is discouraged in their reproduction plans by too small cages, not enough seclusion and disturbing the nest during setting to see how many eggs are there.

Improper sex determination is a breeding factor. Usually the male canary only is possessed of a clear, full song, but this sign alone is not infallible, for the female likewise may sing. The genital eminence in the male may be seen to differ from the female sufficiently to make a proper sex determination, but this art requires skillful training.

Dr. Matsui, of Japan, has perfected and taught a method of sexing commercial day-old chicks to such a degree of accuracy that Japanese sexers, who recently demonstrated this art in America, were found to be over 99 per cent accurate. In California, two American sexers have developed an accuracy of over 98 per cent and a speed of 700 to 800 chicks an hour.

Hospitalization of Caged Birds

Like all pets, caged birds should be hospitalized, if possible, for observation several times daily is highly advisable. Then, too, diet can be controlled much better, for most bird-owners, in their anxiety for the subject, overfeed or feed improperly even when cautioned against so doing. Canaries and love birds or parrakeets should be hospitalized in their own cages. This is important, since strange surroundings may lead to a diminished appetite.

In transporting birds to and from the hospital, remove all perches before so doing to avoid the danger of broken toes, legs and wings. A cloth, or better still, a turkish towel, should be placed on the floor of the cage. This will prevent slipping and fright to the subject. At the hospital, the bird should be placed in a clean cage and its own carefully dismantled, washed in warm soap-suds and, when thoroughly cleaned, dipped in a 3 per cent aqueous sodium hypochlorite solution; the perches painted lightly with an oil and the bird replaced. If the subject be too ill to feed from the perch, then place feed, gravel and water on the floor of the cage. In the case of broken legs or wings, or serious injury, perches should always be left out.

Treating Common Ailments

Of the simpler cases, scaly leg, external parasites, poor feathering, impaired appetite and failure to sing are the most common.

Scaly leg should be treated by immersing the feet and legs, just covering the scaly portions, in a luke warm soap-suds solution. Then with the finger tips soften the scales and remove them without injuring the underlying normal tissues. Wipe dry with rough cloth and apply a light, bland oil or vaseline to the legs and feet only, and remove any excess. This treatment should be repeated once or twice at 48-hour intervals.

Lice are destroyed with pyrethrum or sodium fluoride, repeating the treatment in ten to twelve days to break the reproduction cycle. The common blood-sucking mite is seldom found on the bird except during nocturnal feedings. Since cracks and crevices are his daytime hiding place, he is best destroyed by cleaning cage and spraying with a light oil and painting or dipping the perch. Feet are irritated with excess oil, so this should be avoided by wiping.

Poor feathering is caused by lack of food essentials, or more usually an hereditary principle. Selecting improper individuals in mating should be avoided. While the feather mite has been accused also of causing this mal-condition, microscopic examination, with us, has failed to indict this parasite. A drop of cod-liver oil once a day is indicated.

Lack of gravel or poor quality of food, as well as an over-abundance of extras, may lead to impaired appetite. Supply the first, correct the second, and discontinue the last, and normalcy is usually restored.

Singing is the male's vocal exhibition of love-making. The training of canaries is a specialized business and a fine art. Dis-

continuance of song may follow or accompany moulting, unhappy surroundings, or exposure.

Birds do not need to be kept covered at night to keep warm and healthy, but since the practice is so widespread, it must be continued in the hospital if the bird be accustomed to it at home. Do not cover so completely that fresh air can not be admitted.

Nail and beak trimming is necessary in most caged birds. With the latter, care must be exercised to avoid splitting the beak.

Fractures are a real problem in birds. A broken toe is best amputated. Simple exposed fractures respond rapidly and with little unusual attention. Care should be taken in fitting splints; cover with a thin layer of cotton and apply adhesive tape.

Diarrheas are caused by faulty diet, or contaminated drinking water. Too much vegetable matter or fruit will cause this disturbance.

Bird seed mixtures, gravel, fresh water for both drinking and bathing, and a sweetened food, known as bird treat, and cuttle bone with a small piece of lettuce, carrot or apple once or twice a week constitute a well balanced diet.

Constipation may be produced by withholding gravel, necessary to properly grind food, or improper diet.

At a recent alumni gathering, celebrating fifty years of institutional veterinary science, Dr. John R. Mohler said:

> In my judgment, there are many undeveloped opportunities for the veterinary profession to occupy spheres of increased usefulness, especially along economic and social lines.

Surely, avian pathology is representative of this statement. Economically, the general practitioner has been lax in caring for the diseases of chickens and turkeys; he must correct this, else be content to leave the health of the second largest agricultural industry of these United States in the hands of the layman.

The specialist, the hospital-owner in metropolitan areas, especially will increase his usefulness, his scope of unselfish service and his financial return by taking time to prepare himself to care for these feathered subjects, that man has taken from nature and, against their will, caged them, that they may beautify his home and cheer his surroundings.

We know the truth, not only by the reason, but also by the heart.—PASCAL.

73rd Annual Convention A. V. M. A.
Columbus, Ohio, August 11-12-13-14

INTESTINAL EMPHYSEMA IN SWINE*

By H. E. BIESTER, D. F. EVELETH *and* YOSHIO YAMASHIRO†
Veterinary Research Institute
Iowa State College

Intestinal emphysema (synonyms: mesenteric emphysema, *pneumatosis cystoides intestini*) in swine, observed from time to time in the United States, was first described by Mayer, in 1815, under the designation of *pneumatosis cystoides intestini.* The process may involve the small intestinal wall, mesentery and lymph-nodes draining it. Most pathologists consider intestinal emphysema a disease of unknown etiology, although a number of theories have been advanced. Among these are the formation of gas by *Escherichia coli* or closely related organisms, the forcing of gases through an injured mucosa by muscular contractions, bacterial action in the presence of large quantities of sugar in the ration. The literature is adequately reviewed by Cadeac[1] and Joest.[2] Over a period of years, we have at times encountered field cases of intestinal emphysema which were studied bacteriologically and histologically. No growth was obtained on solid or liquid media. The histopathology failed to suggest the nature of the etiological factor. About a year ago, we encountered two cases of intestinal emphysema in a group of chickens that were fed a ration in which rice was used as the basic grain constituent. The birds were killed at about 2½ months of age. In a second series of chicks fed rice, emphysema was not found.

While engaged in a study of incoördination in swine, it became desirable to use a ration in which polished rice constituted the grain ingredient. Two pigs (4771 and 4772), weighing 81 and 82 pounds, respectively, were placed in cement-floored pens on the following ration:

Polished rice	78.7%
Acid-washed casein	10.0%
Tankage	10.0%
Bone meal	1.0%
NaCl	0.3%

Each pig was given 15 cc of cod-liver oil daily. Three months later, pig 4771 weighed 214 pounds and pig 4772 weighed 201 pounds. Both pigs, on autopsy, showed very advanced intestinal emphysema extending to the lymph-nodes draining the small intestine. At the same time, pigs 4763 and 4764, weighing 72 and 90 pounds, respectively, were fed the following ration:

*Received for publication, June 25, 1935.
†Senior veterinary student majoring in diseases of swine.

Polished rice	78.7%
Skim milk powder	10.0%
Tankage	10.0%
Bone meal	1.0%
NaCl	0.3%

Each pig was given 15 cc of cod-liver oil daily. Three months later, these pigs (4763 and 4764) weighed 204 and 231 pounds, respectively. When autopsied at this time, both showed extremely advanced lesions of intestinal emphysema. All four presented an involvement of the greater portion of the ileum, the entire jejenum, as well as a small part of the duodenum and the adjoining mesentery. Some cysts were clear, filled only with gas, appearing either singly or in clusters with pedicles of varying lengths. In many instances the cysts appeared red, brown or brownish gray.

Pigs 4787 and 4788, from the same litter as the previous four pigs, were held on an experimental ration of white corn, skim milk powder, bone meal and salt. Neither pig showed any evidence of intestinal emphysema. In view of the fact that intestinal emphysema had not previously occurred in any of the pigs raised on the farm, the existence of a correlation between rice feeding and intestinal emphysema was suggested.

EXPERIMENT 2

A litter of four pigs available at the time was divided into two groups and placed on the rations given in table I.

TABLE I—*Data on experiment 2.*

RATION	PIG	INITIAL WEIGHT 5–19–34 (LBS.)	FINAL WEIGHT		EMPHYSEMA
			LBS.	DATE	
Polished rice 78.7% Tankage 10.0% Acid-washed casein 10.0% Bone meal 1.0% NaCl 0.3% Cod-liver oil (daily) 20 cc	4781	37	100	10– 3–34	—
	4782	47	42	8–22–34	—
Polished rice 78.7% Tankage 10.0% Skim milk powder 10.0% Bone meal 1.0% NaCl 0.3% Cod-liver oil (daily) 20 cc	4783	50	133	9–14–34	+
	4784	41	137	9–14–34	+

Pigs 4781 to 4784 were placed on this experimental ration shortly after weaning. Pig 4782 gained for a time, but developed anorexia and lost weight. Its clinical manifestations and the histopathology will be considered in connection with a report to be made later on B-avitaminosis in the pig. The absence of emphysema in pig 4782, after being on the experimental ration about three months, raised the question whether or not size and growth rate might be a factor. Consequently the other pigs of this series were continued on this ration. Pigs 4783 and 4784 were killed about three weeks later, weighing 133 and 137 pounds, respectively. Both showed good evidence of intestinal emphysema although not so advanced as in the previous project.

Pig 4781 was kept on this experimental ration about 4½ months in order to increase its weight if possible. It failed to make significant gains on this ration during the latter part of the period and was killed, weighing 100 pounds. Upon autopsy it failed to show emphysematous lesions.

EXPERIMENT 3

A third experiment in connection with studies on B-vitamin-deficient rations and their controls in which polished rice was

TABLE II—*Date on experiment 3.*

FED	PIG	INITIAL WEIGHT 8–3–34 (LBS.)	FINAL WEIGHT		EMPHYSEMA
			LBS.	DATE	
Ration 1*					
Rice 88.7%					
Tankage 10.0%	4797	42	116		++
Bone meal 1.0%	4799	55	135		++
NaCl 0.3%					
Cod-liver oil				12–5–34	
Ration 1 plus yeast	4793	27	78		+
	4798	47	140		+
Ration 2*					
Rice 88.7%					
Alcohol-washed casein 10.0%	4794	36	85	12–17–34	—
Bone meal 1.0%	4795	35	73	11–14–34	—
NaCl 0.3%					
Cod-liver oil					
Ration 2 plus yeast	4796	43	121	11–14–34	+
	4792	28	89	11–28–34	—

*Ferric chloride was included in the rations.
11-15-34, protein doubled in all groups.

fed are considered here only from the standpoint of the occurrence of intestinal emphysema. Table II shows the rations, and initial weight and weight of each pig on the date killed.

In this group (table II) five pigs showed intestinal emphysema, and with only one exception their weights were considerably above 100 pounds. The process in question was not nearly so advanced as in group 1 in which the pigs weighed around 200 pounds at the time of autopsy. Pig 4793 is the only one of the entire project under 100 pounds, in which mesenteric emphysema occurred. It will be noted from this table that with the one exception mentioned the three negative cases weighed under 100 pounds. Pig 4793 presented the least advanced process —only about one foot of the anterior ileum and its junction with the mesentery being involved by the emphysematous process. The subserosa of the intestinal wall was only slightly involved. The lymph-nodes draining the small intestine were not affected grossly or microscopically. The absence or presence of vitamin B did not seem to be a factor in the causation of intestinal emphysema. All subjects received an adequate supply of vitamin A in the form of cod-liver oil. No manifestations of rickets were found in any of the subjects. In group 3 (table II) each of the four pens was made up of pigs from different litters. At no time has the disease been encountered on the Institute farm previously or subsequently unless rice was used as the basic grain constituent.

Experiment 4

In order to obtain additional data and to ascertain if the basic protein supplement fed with rice might influence the results, one pen of rice-fed pigs was given tankage while another was fed skim milk powder. A third pen was fed yellow corn and skim milk powder. The initial weights, rations and weights before autopsy are given in table III.

It will be noted that only one pig from the six rice-fed subjects failed to show emphysema, although it weighed 188 pounds. This is the only instance in these series where a pig weighing over 100 pounds failed to develop intestinal emphysema while receiving rice as the grain component in the ration.

Pathology

Gross: The emphysematous formations were confined to the wall of the jejenum and ileum and the posterior part of the duodenum and the adjacent mesentery as well as the mesenteric lymph-nodes of the involved parts. The most pronounced lesions in the

TABLE III—*Data on experiment 4.**

RATION		PIG	INITIAL WEIGHT 9–26–34 (LBS.)	FINAL WEIGHT 12–26–34 (LBS.)	EMPHYSEMA
Rice	77.7%				
Tankage	19.0%	8795	79	188	−
Bone meal	1.0%	8780	46	122	+
Salt	0.3%	8798	45	99	+
Yeast	2.0%				
Rice	79.7%	8792	74	185	++
Skim milk powder	19.0%	8779	54	125	+++
Bone meal	1.0%	8718	51	108	++
Salt	0.3%				
Yellow corn	79.7%	8703	59	123	−
Skim milk powder	19.0%	8736	73	128	−
Bone meal	1.0%	8760	76	155	−
Salt	0.3%				

*Ferric chloride and cod-liver oil were included in the rations.

form of gaseous cysts were found in the immediate vicinity of the junction of the mesentery and intestine (figs. 1 and 2). In one pig, emphysematous lesions were present in the adductor muscles near the *symphysis pubis*. The same case also presented a few cysts on the rectal serosa, some of which contained blood. With this one exception, in every case produced experimentally the lesions were confined to the small intestine, its mesentery and mesenteric lymph-nodes. In the vicinity of the intestino-mesenteric junction, the changes consisted of single cysts or clusters varying in size from less than a millimeter to more than 1 centimeter in diameter. Some cysts showed no pedicle, while in other instances pedicles were 1 or 2 cm long. Usually a cluster of cysts was attached to each pedicle, often the cysts being so closely placed that the underlying structures were hidden, suggesting a mound of bubbles. In the less advanced process the cyst wall consisted of a thin, smooth, slightly translucent wall. In these cases the cyst contained only gas (figs. 1 and 2).

The gaseous cysts located in the vicinity of the intestino-mesenteric junction burst with a loud noise when squeezed. The gas contained could not be displaced in these, the cysts rupturing when sufficient pressure was exerted. In the more advanced cases many cysts appeared red or brownish red. In some instances the cysts were completely filled with red or grayish red clotted blood

and distended vessels. In other instances the red appearance was due to a thickening of the cyst wall as a result of blood stasis (figs. 3 and 4). The occurrence of the blood in the cyst or cyst wall is apparently brought about by a twisting of the pedicles, interfering with the circulation. This development should

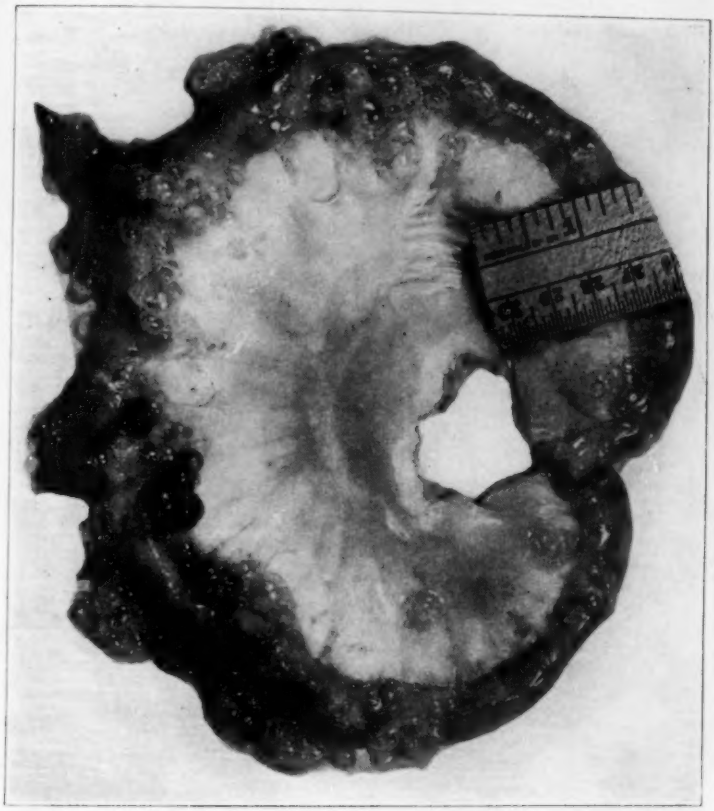


FIG. 1. Showing gas-filled and partly organized (red) vesicles. Intestinal wall only slightly involved.

be reconstructed from successive changes observed in cases of various stages of development.

In some instances the twisting of the pedicle caused stasis and accumulation of blood in the thickened vesical wall near its pedicle, while the balance of the cyst contained air and the lower part of the cyst wall appeared almost transparent or translucent. The cysts are made up of distended lymph-spaces. In those instances where the cysts or walls are distended by blood or where clots

are found, numerous endothelial proliferations and new vascular formations suggesting organization and canalization of a thrombus. In very advanced cases giant-cells appear in the tissue forming the cyst, especially in the pedicular tissue and near its attachment to the intestinal or mesenteric serosa (fig. 5).

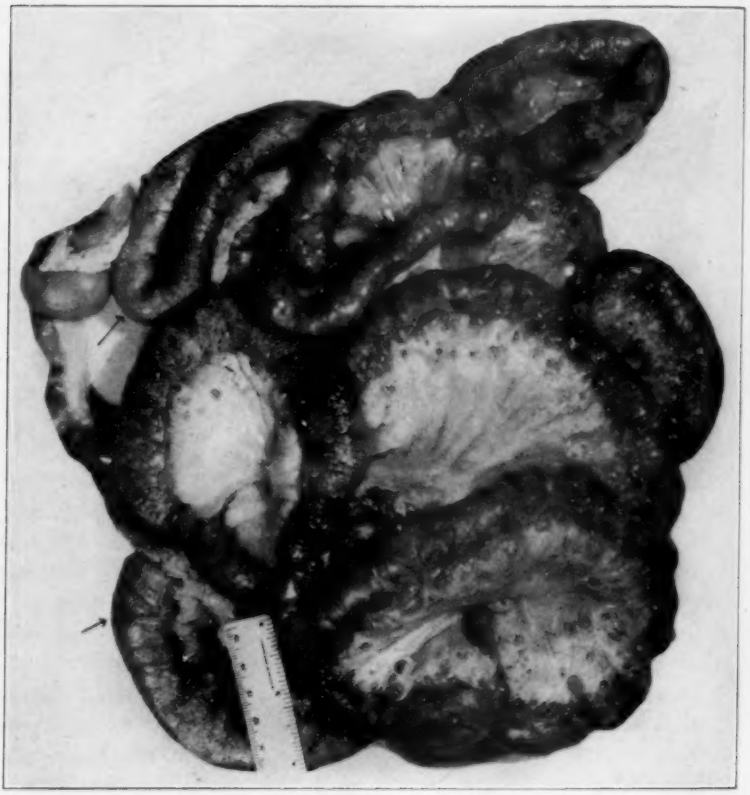


FIG. 2. Showing two types of vesicles and subserous emphysema with ruptured and atrophied major muscle layers (arrows).

If the process affected the mesentery some distance from its attachment to the intestine, pedunculated cysts were less frequent and the process usually manifested itself in the form of blebs in the tissue between the two serous layers. In some instances the blebs caused the serous layer to bulge markedly. Many smaller cysts occurred in the mesenteric connective tissue. Whether or not the bleb forms become pedunculated cysts could not be determined from the material studied.

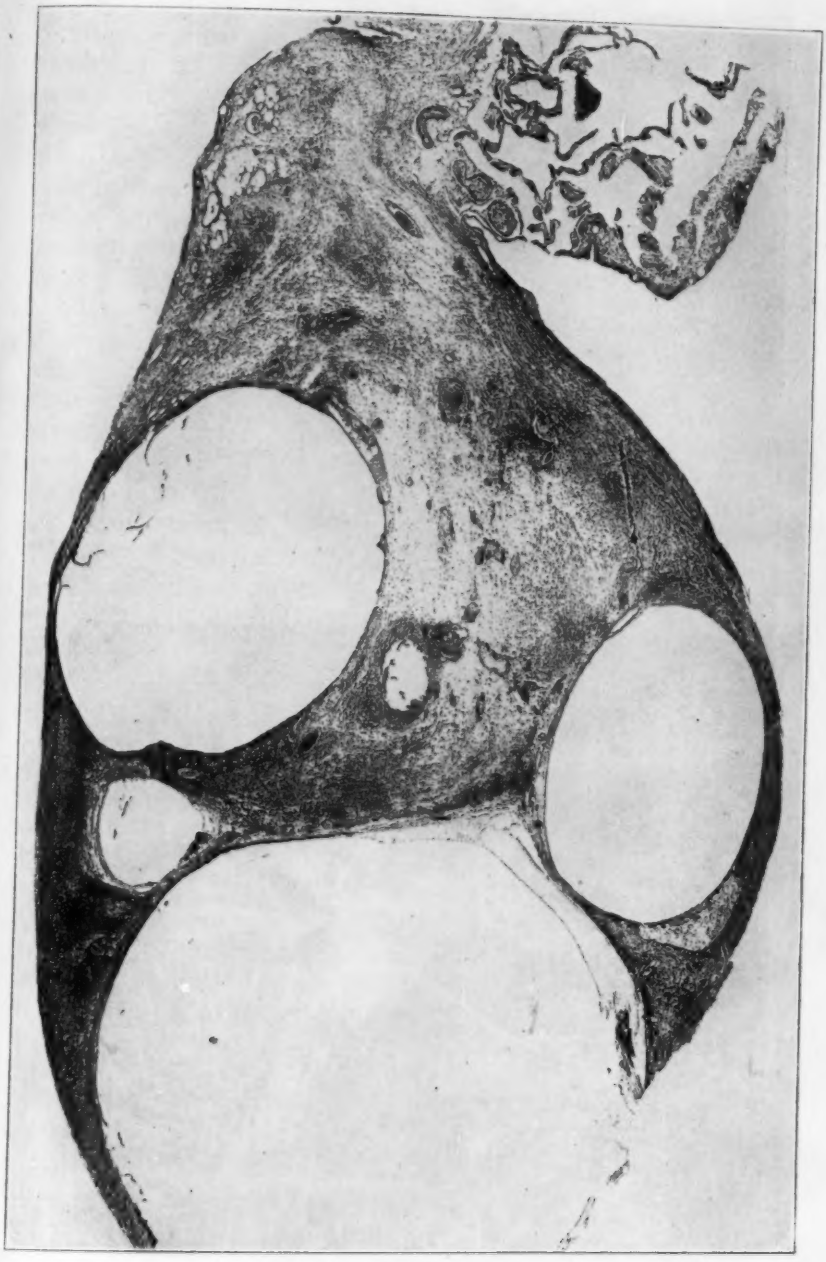


FIG. 3. Pedicle tissue and walls of cysts becoming filled with blood due to stasis (x 16).

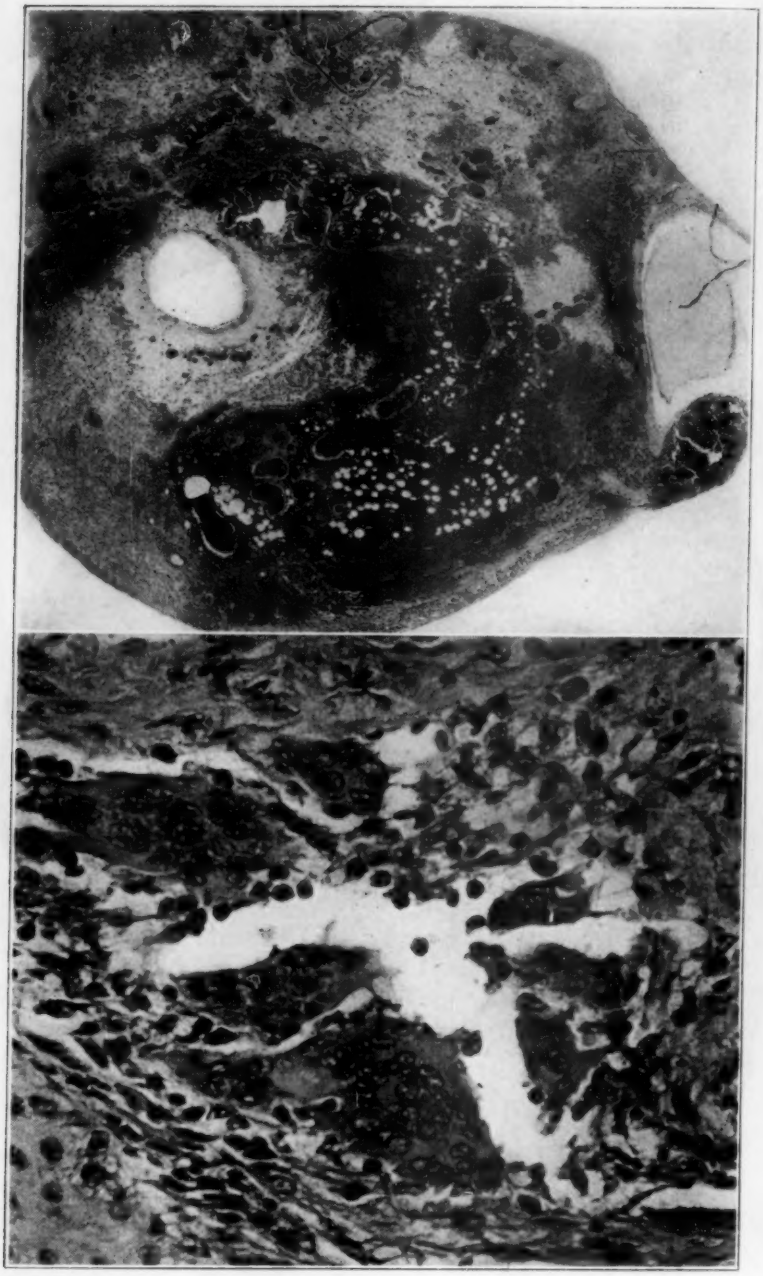


FIG. 4 (above). A red cyst almost completely filled with blood, connective tissue, newly formed blood-vessels due to stasis resulting from twisting of the pedicle (x 16).

FIG. 5 (below). Giant-cell formation in subserosal tissue and pedicle tissue (x 400).

The intestinal wall of the jejunum and part of the ileum is invariably involved. In some cases of the series the terminal portion of the duodenum also was affected. The intestinal wall is thickened and emphysematous and crepitates upon pressure (fig. 6). It appears somewhat stiffened as a result of the emphysematous process. The exterior of the intestine shows foci or minute spots of congestion on a grayish background with myriads of translucent areas suggesting ruptures in its two major muscle layers (fig. 2).

Histologic examination indicates that a progressive emphysema distends the submucosa and exerts pressure on the mucosa and muscle layers (inner circular and outer longitudinal). In many instances the major muscle layers become stretched, or completely atrophied in places, so that the emphysematous process or gaseous cysts will extend to the subserosa and serosa through these muscle breaks or atrophy. Upon incision the intestinal wall shows gross emphysematous formations seen chiefly in the submucosa. Histologic study shows its occurrence also in the mucosal lymph-spaces (fig. 6). Sometimes the mucous membrane in the affected sections is raised. Considerable catarrhal inflammation and bright red areas of congestion or hemorrhage appear in the mucosa but no blood escapes into the lumen.

The lymph-nodes of the mesentery opposite the affected intestinal sections often show large numbers of cysts, sometimes giving the cut surface of the node a honeycomb appearance. At times only one or two cysts are visible grossly (fig. 7). The slightly affected cases showed neither gross nor microscopic mesenteric lymph-node involvement. The process is one which results from a distention of the lymph-spaces in the locations mentioned. In the advanced cases the intestinal process is associated with striking infiltration by myelocytic esoinophiles. In the less severe cases this was not true. Likewise the giant-cell formation in confluent cysts, described by Cohrs, Joest and others, was not present in the less severe cases produced experimentally over a period of from three to four months.

The involvement of the lymphatics and the presence of dense myelocytic eosinophilic infiltrations in the advanced cases suggested the advisability of determining the hematologic picture. Table IV shows the red and white counts on a group of pigs fed yellow corn and two groups fed rice. (The corn and rice were supplemented by skim milk powder, casein or tankage, bone meal, iron and cod-liver oil.) Group 1 fed corn showed no emphysema. The rice-fed group, with one exception (pig 8795), de-

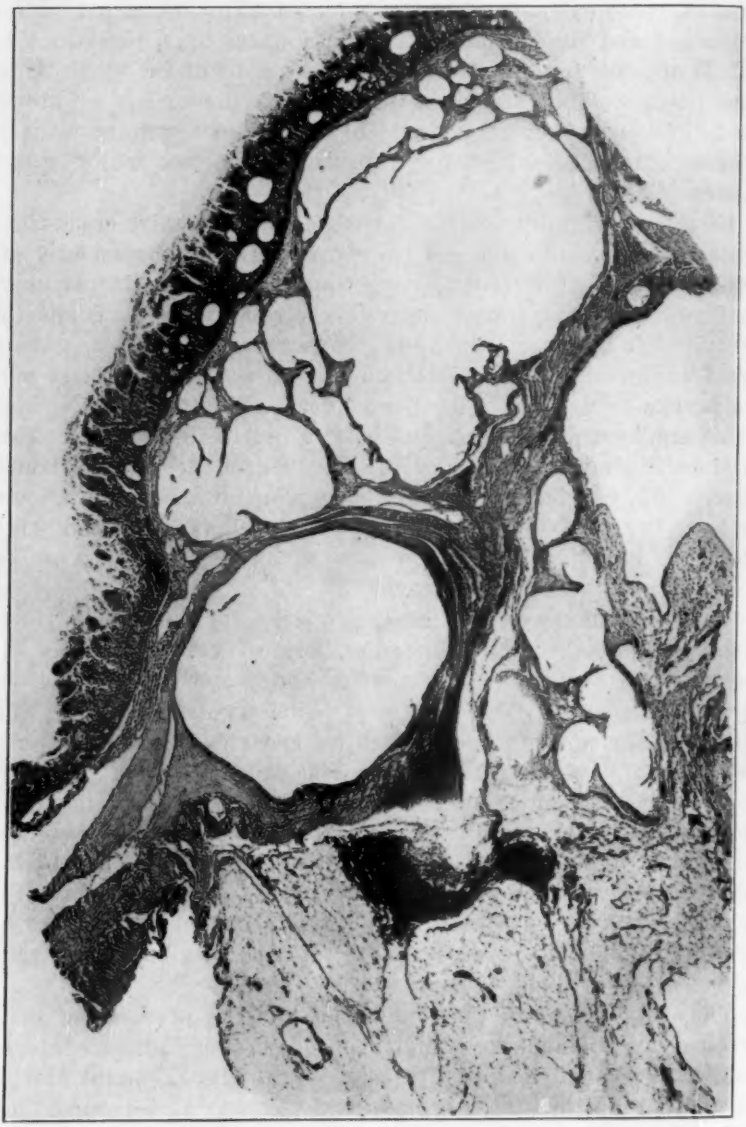


FIG. 6. Small intestine showing emphysematous formations in all parts of the wall (x 16).

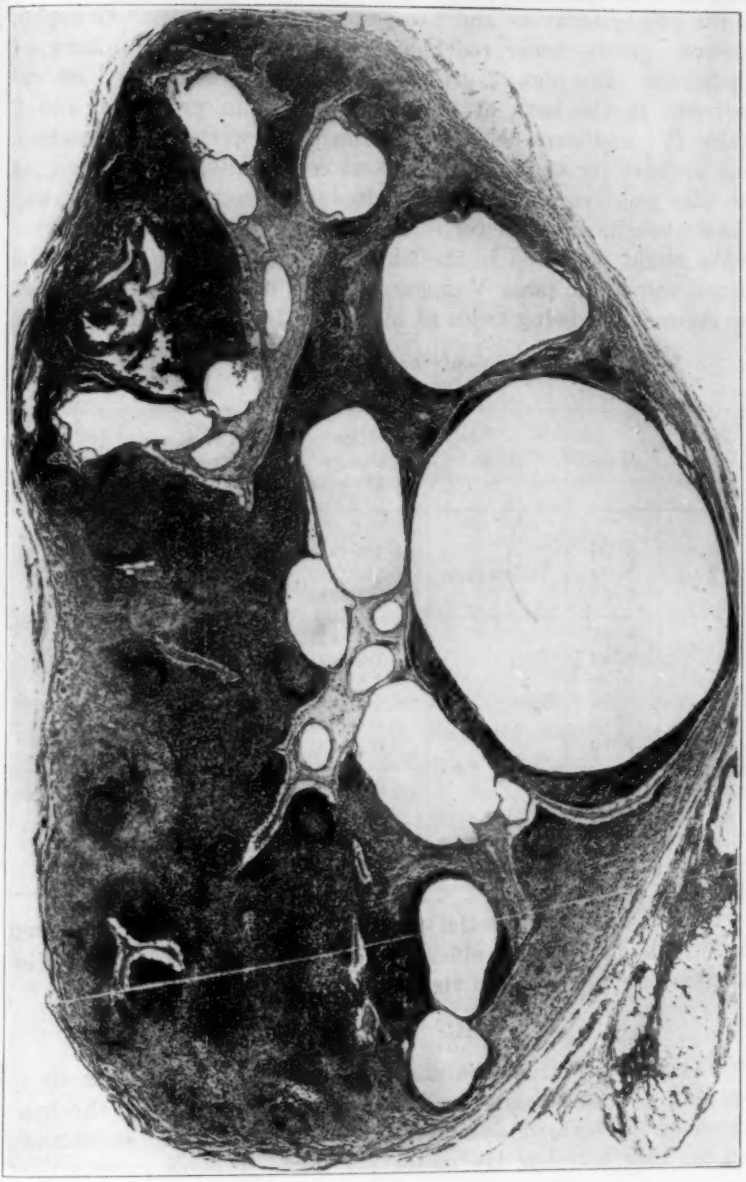


FIG. 7. Mesenteric lymph-node showing emphysematous process (x 16).

veloped intestinal emphysema. No significant differences appear in the emphysematous and non-emphysematous cases. Group 3, however, shows fewer red blood cells and smaller numbers of white cells. The pigs of group 3 (table IV) were placed on experiment in the barn at an earlier age than groups 1 and 2 (table IV) and were held on experiment six weeks longer, which may account for the lower red blood cell counts. While none of the pigs was very heavily parasitized with round worms, group 3 as a whole harbored fewer round worms which might be a factor in the slight variation in the white cell counts. The differential counts shown in table V apparently support that assumption, the eosinophiles being twice as numerous in groups 1 and 2.

TABLE IV—*Blood counts on three pigs fed yellow corn and ten pigs fed rice.*

GROUP	PIG	FED	RED BLOOD CORPUSCLES	WHITE BLOOD CORPUSCLES	EMPHYSEMA
1	8760	Yellow corn	6,400,000	15,300	—
	8736		6,960,000	15,000	—
	8703		6,400,000	21,320	—
2	8795	Rice	6,040,000	16,000	—
	8780		6,160,000	18,600	+
	8798		6,320,000	16,300	+
	8792		6,400,000	21,300	+
	8718		5,600,000	18,700	+
	8779		6,080,000	21,100	+
3	4793	Rice	5,600,000	17,900	+
	4798		4,240,000	14,000	+
	4797		5,600,000	18,800	+
	4799		5,280,000	14,600	+

Table V shows differential counts of the three groups referred to in table IV. No significant differences appear between the emphysematous cases and those not showing this process.

BACTERIOLOGY

Cultures made from the gas-distended cysts as well as those containing blood remain sterile. Media inoculated from the honeycombed mesenteric lymph-nodes, emphysematous submucosa and the bleb forms in the mesentery failed to show growth.

BLOOD CHEMISTRY

Throughout the course of this investigation, various chemical determinations have been made on the blood of the emphysema-

TABLE V—*Differential counts on same pigs as in table IV.*

	Pig	Acc.	Differential Count					Emphysema
			Lympho.	Neutro.	Mono.	Eosin.	Bas.	
Group 1—fed yellow corn	8760	639	61.6	27.4	4.9	5.1	1.0	—
	8736	640	58.7	29.2	7.0	4.1	1.0	—
	8703	641	48.6	39.8	5.4	4.8	1.4	—
	Average		56.3	32.1	5.8	4.7	1.1	
Group 2—fed rice	8780	633	59.6	30.9	4.8	3.7	1.0	+
	8798	634	46.9	43.9	3.7	4.1	1.4	+
	8792	635	59.0	34.5	4.3	2.2	0.0	+
	8718	636	53.6	37.5	2.4	3.4	3.1	+
	8779	637	48.5	42.7	5.2	2.8	0.8	+
	8795	638	40.2	54.6	3.4	1.7	0.1	—
	Average		51.3	40.7	4.0	3.0	1.0	
Group 3—fed rice	4793	623	52.3	39.7	6.0	1.3	0.7	+
	4798	622	69.8	25.3	3.6	1.0	0.3	+
	4797	631	50.5	40.4	6.1	2.5	0.5	+
	4799	632	60.5	34.2	3.3	1.0	1.0	+
	Average		58.3	34.9	4.8	1.4	0.6	

tous pigs in an attempt to determine the etiological agent. The blood was drawn at the time of killing and analyzed by standard methods. As has been the practice in this laboratory in blood studies, the animals were fasted at least twelve hours before taking the sample. The data are summarized in table VI.

TABLE VI—*Data on blood analyses.*

	Constituent		Range	Average
Whole blood	Urea N	mg %	7.52–8.95	8.23
	Amino acid N	mg %	6.73–9.22	7.97
	N P N	mg %	35.41–48.20	41.85
	Sugar	mg %	27.00–93.50	50.25
Serum	Calcium	mg %	9.95–12.01	10.58
	Magnesium	mg %	1.50–3.82	2.45
	Inorganic P	mg %	6.15–9.85	7.85
	Lipoid P	mg %	9.00–9.67	9.37
	Oxalic acid	mg %	10.90–18.45	15.25
Plasma	CO_2 content vol.	%	36.00–52.80	44.79
	CO_2 capacity vol.	%	51.00–64.00	59.50

An attempt was made to analyze the gas in some of the larger emphysema cysts. No quantitative results could be obtained but the gas appeared to be mostly oxygen and nitrogen.

Examination of the urine failed to show the presence of any more glucose than is found in normal fasting pigs. A small amount of copper-reducing substance is frequently found in swine urine. Many samples of urine from the emphysema pigs were negative to slightly positive for copper-reducing substances. The blood sugar fell well within the range of normal pigs and no difference was noted between the pigs fed rice and tankage and those fed rice and skim milk powder. This would indicate that the amount of carbohydrate available in the feed had nothing to do with the production of intestinal emphysema.

In line with the same theory of excess sugar metabolism would be the production of oxalic acid. Unpublished observations made in this laboratory indicate that during sugar metabolism there is an increase in the oxalic acid content of the serum. The oxalic acid concentration in the serum of these swine fell well within the normal range. If the theory that sugar breakdown with the production of carbon dioxide were the cause of the emphysema, one would expect to find CO_2 in the cysts and a large excess of CO_2 in the plasma. This was not the case in either respect. The CO_2 content of the plasma was normal to slightly low, while the gas in the cysts was not CO_2.

Neither the blood chemistry nor the pathology would indicate that there was any impairment in protein metabolism. The livers and kidneys appeared normal and the blood amino-acid nitrogen and urea nitrogen were in the average range. These constituents were determined only on pigs 4771 and 4772, but these were cases of long standing and should have shown evidence of kidney involvement if any were present.

Lipoid phosphorus was determined in only two cases (4783 and 4784). The low fat in the ration makes it unlikely that one would find a high lipoid phosphorus in the blood.

From the data available the most plausible explanation seems to consider the emphysema to be of intestinal origin. The permeability of the intestine may have become increased, due to some toxic product in the ration or due to the absence of something of unknown character. Constipation did not seem to be a factor, as the pigs were not observed to strain in defecating. Vitamin B does not seem to be a factor, as emphysema occurred when a yeast supplement was given and when skim milk powder was used. The relationship of growth to production of emphy-

sema seems indicated. It may be that when a sub-minimum of vitamin B is present it may be used in growth and there not be enough left to maintain a sufficiently healthy condition of the intestine to prevent the escape of gases into the tissue.

Summary

A consideration of the data summarized in table VII shows that, weight not considered, 16 of 22 pigs fed rice developed emphysema while six remained negative, or a total of 72.7 per cent fed rice developed intestinal emphysema. However, it appears that growth or weight is a factor in the occurrence of the condition. Only one rice-fed pig weighing over 100 pounds failed to show emphysema. If all rice-fed pigs weighing 100 pounds or less are left out of consideration, there appears only one case in which emphysema did not develop, while 14 cases (93.3 per cent) were positive. While only five controls receiving corn as grain are shown in the table, during the course of the investigations more than 20 additional pigs were fed corn and 20 per cent skim milk powder but emphysema was not found in them or in any pig not receiving rice.

The data seem to refute the hypothesis that large quantities of milk sugar present in milk are a factor in the causation of intestinal emphysema, on the ground that it is frequently observed where great quantities of skim milk are fed swine on dairy farms. The process also appeared in rice-fed pigs when the protein supplement was composed of tankage. When corn was fed with skim milk powder as high as 20 per cent of dry weight, intestinal emphysema did not appear. It is possible that the grain being fed rather than the milk may be a factor. The presence or absence of vitamin B does not seem to be concerned in the appearance of emphysema.

Whether or not emphysema is attributable to a deficiency in the composition of rice or to an emphysema-stimulating ingredient cannot be stated. Further studies are being instituted to determine, if possible, what feed or feeds are responsible for its appearance in the field and the nature of the casual factor.

Although the experimental rations fed include a grain, a protein ingredient, bone meal, salt, iron and cod-liver oil, either with or without yeast, for convenience only the grain, yeast, and protein supplement are given in the summarizing table (VII).

Conclusions

1. Intestinal emphysema has been associated with feeding polished rice.

TABLE VII—*Summary of data on feeding experiments.*

PIG	RATION	YEAST	FINAL WEIGHT (LBS.)	EMPHYSEMA
4797	Rice, tankage	—	116	++
4799		—	135	+
4793		+	78	+
4798		+	140	+
8795		+	188	—
8780		+	122	+
8798		+	99	+
4771	Rice, tankage, acid-washed casein	—	214	++++
4772		—	201	++++
4781		—	100	—
4782		—	42	—
4763	Rice, skim milk powder, tankage	—	204	++++
4764		—	231	++++
4783		—	133	+
4784		—	137	+
4794	Rice, alcohol-washed casein	—	85	—
4795		—	73	—
4796		+	121	+
4792		+	89	—
8792	Rice, skim milk powder	—	185	++
8779		—	125	+
8718		—	108	+++
4787	White corn, skim milk powder	—	200	—
4788		—	295	—
8703	Yellow corn, skim milk powder	—	123	—
8736		—	128	—
8760		—	155	—

2. The kind of protein supplement did not affect its appearance when rice was fed.

3. When corn was fed with as much as 20 per cent skim milk powder by dry weight, emphysema failed to develop.

4. The process consists of a gaseous distention of the lymph-spaces involving the intestinal mucosa, submucosa, inner and outer muscle layers, serosa, mesentery, and the lymph-nodes draining the affected portion.

5. The process usually involves the entire jejunum, part of the ileum and in some cases the terminal portion of the duodenum. In one instance cysts were found on the rectal serosa and the adductor muscles near the *symphysis pubis*.

6. Vitamin B did not appear to be a factor.
7. Bacteriologic examinations were negative.
8. No significant hematologic deviations were associated with intestinal emphysema.
9. Two cases of intestinal emphysema were encountered in several groups of chickens on a test ration containing rice.
10. The blood chemistry of the swine was normal as far as it was investigated.

REFERENCES

[1]Cadeac, M. C.: Vesicules gazeuses du mesentere chez le porc. Jour. Méd. Vét. (1909), pp. 416-418.
[2]Joest, E.: Specielle Pathologische Anatomie der Haustiere (1919), i, pp. 571-576.

Rabies in Illinois and Michigan

According to a report from Dr. H. C. Rinehart, Chief Veterinarian, Illinois Department of Agriculture, rabid dogs were found in 52 counties in Illinois during the first three months of 1936. The first week in May saw 23 areas in the state quarantined on account of the disease.

There has been a steady increase in the prevalence of the disease for several years. In 1934, rabies cost Illinois over nine thousand dollars for 1,459 Pasteur treatments. In 1935, the number of Pasteur treatments required increased to 2,248 and cost the state $13,445.69.

However, the money spent for Pasteur treatments, given to persons who have been bitten by or exposed to rabid dogs, is only a part of the financial loss. The counties in which farm animals are lost from rabies are required to remunerate the owners, the money coming from the county dog tax fund. Last year the claims in 20 Illinois counties averaged more than $2,500.00.

Dr. F. J. Jirka, Director, Illinois Department of Health, issued a statement recently, directing attention to the serious aspects of the rabies situation in Illinois, and recommending the prophylactic vaccination of dogs against the disease.

Michigan also reports a serious situation in Genesee County, which is under a two-month quarantine for rabies. Five persons in Flint and an entire family near the city were bitten by rabid dogs early in May. Ten cases of rabies in dogs in Flint and vicinity were diagnosed during April. During the latter part of May, a positive case was diagnosed in a dog in Lansing after the animal had bitten a man. City Veterinarian Hamann warned dog-owners to watch their pets and advised antirabic vaccination.

EPITHELIAL DIVERTICULA IN THE LARGE INTESTINE OF SWINE*

By H. C. H. KERNKAMP, *Saint Paul, Minn.*
Division of Veterinary Medicine
Minnesota Agricultural Experiment Station

From time to time during the past 15 or 20 years, the writer has observed small nodular bodies of macroscopic dimensions in the walls of the large intestine of swine. Until recently it was assumed that the nodules represented lesions produced by parasites of the genus *Esophagostomum*. This assumption proved to be erroneous because of the constant failure to find parasites or evidence of parasitic irritation and because it was found that the nodular lesions represented outpocketings of the intestinal epithelium, surrounded to a greater or lesser extent by lymphoid tissue.

The occurrence of small nodular structures in the intestines of swine, similar to if not identical with those here recorded, have been observed and reported in the literature. According to Lewis and Thyng,[1] Klein, in 1878, and Retterer, in 1895, described areas of intestinal glands that had become depressed to form a pocket. Lewis and Thyng express their indebtedness to the late Theobald Smith for having demonstrated epithelial structures in the submucosa in a young pig. In fact, these writers state that "the extension of intestinal glands (crypts of Lieberkühn) through the *muscularis mucosa* in relation with a lymph-nodule is a common occurrence." The importance of the lesion, insofar as it relates to the well-being of the animals in which it occurs, is not definitely known at present. That it may have some relation to more obvious pathology in the large intestine seems reasonable and quite likely.

PRESENT INVESTIGATION

Having failed to find larvae or other semblance of parasitic invasion in a number of nodular bodies obtained from the colon of an 80-pound Duroc-Jersey pig, other of the nodules were collected for histological examination. Similar nodules have been collected and prepared for microscopic study from nine more porcine cadavers that were brought to our laboratories for examination and diagnosis of their ailments. The results of the findings on the histologic appearance of the nodular bodies furnish the material for this paper.

*Paper No. 1392, Journal Series, Minnesota Agricultural Experiment Station. Received for publication, November 26, 1935.

The first and most striking observation gained from a microscopic examination of sections was that the nodules contained epithelium and that it was typical of the epithelium of the colonic mucosa. The second point of interest was the occurrence of the nodules in the submucosa, *i.e.*, between the *muscularis mucosa* and the circular layer of the muscle coat. The third important observation was that in many cases the epithelial structures were almost completely surrounded by greater or lesser amounts of lymphoid tissue.

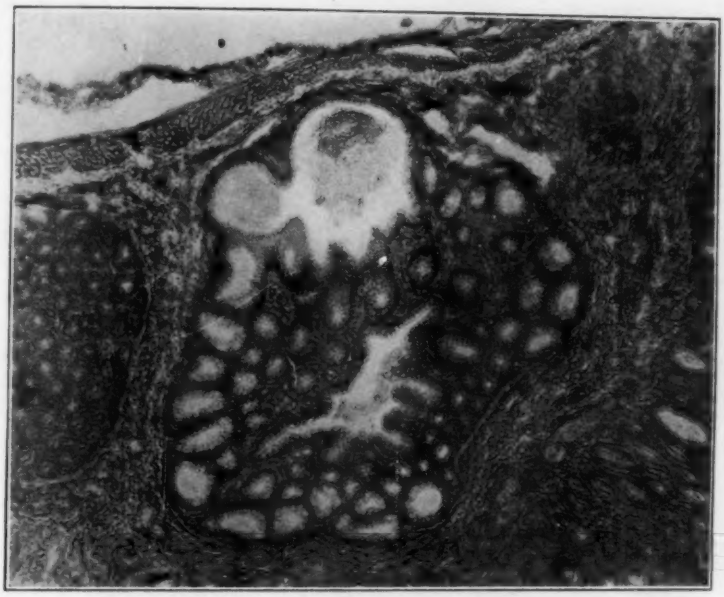


FIG. 1. An epithelial diverticulum in which the "nodule" is entirely composed of epithelium and a small amount of the *lamina propria*. The branching arrangement of the crypt-like structures is clearly shown in this section.

The morphological arrangement of the epithelium in the nodules has been learned from serial sections. The most constant arrangement is crypt-like, *i.e.*, typical of the crypts of Lieberkühn. In some cases a single alveolar epithelial crypt extended deep into the nodular body, and surrounding the crypt was a relatively large amount of lymphoid tissue. The greater part of the nodule in this instance was lymphoid tissue. At the other extreme, the nodule was composed almost entirely of crypt-like epithelial structures (fig. 1). Little or no lymphoid tissue was present in this type. Between these two extremes, the amounts of epithelial and lymphoid tissues which comprise a nodule will vary. The arrangement of the epithelium in most of the nodules

studied follows the pattern characteristic of a single-branched acinous gland. Some, however, are more typical of simple alveolar glands.

In many of the nodules examined, the epithelial crypts communicate with the mucous membrane lining the gut by a short duct or tubular arrangement (fig. 2). On the other hand, nodules have been seen where no communication between the crypts and the gut lumen could be demonstrated. In this case, the nodule is more or less completely surrounded by a thin layer of smooth

FIG. 2. A markedly dilated epithelial diverticulum in the submucosa of the colon that is discharging its contents in the lumen of the gut.

muscle. Where communication is established, thin sheets or layers of the *muscularis mucosa* are reflected around the nodule, the reflection beginning where the duct or tube passes into the mucosa. The point of reflection forms a sort of annular ring about the communicating tubule.

The cells of the epithelial crypts in the nodules are of the simple columnar variety. Typical goblet cells also are present. These rest on a basement tissue that resembles the reticular tissue characteristic of the *lamina propria* of the normal mucous membrane. The fact that many of the cryptic structures are functioning is indicated by their mucinous content. In fact, in some cases this material seems to become impounded to the extent that the crypt is markedly dilated and a retention cyst is

produced. Nodules have been seen where the epithelial structures were undergoing necrosis and liquefaction (fig. 3).

Gross Appearance

The nodules, as they occur in the intestinal wall, can be seen quite readily by gross inspection. The largest we have measured was between 6 and 7 mm in diameter and the smallest, 1 mm.

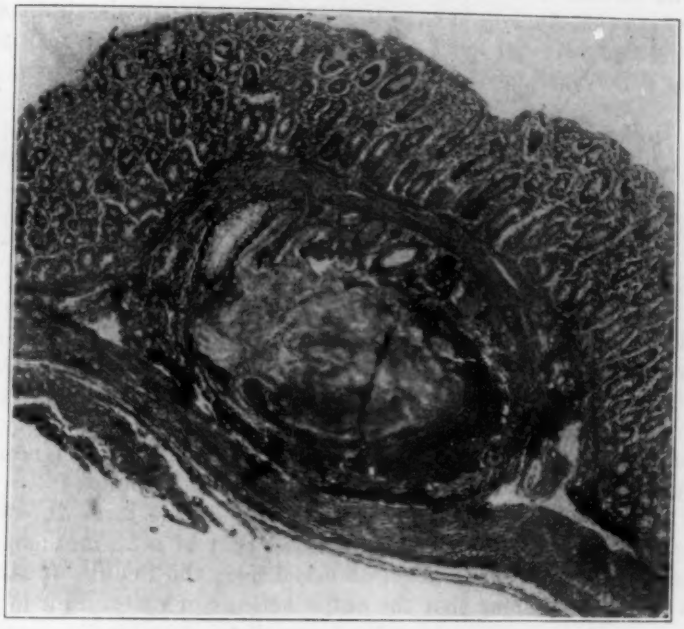


Fig. 3. An epithelial diverticulum undergoing necrosis and liquefaction.

More commonly they measure from 2 to 3 mm. Some of the nodules are raised so that they extend slightly above the external surface of the gut wall while others are more flush with the surface. The color varies, some appearing yellowish-white, others reddish-yellow. At times the borders are marked by a thin hemorrhagic halo. The nodules are usually best seen by inspection of the serous surface of the bowel but may be found by careful examination of the mucous surface. The mucous membrane over the nodule will be slightly raised and sometimes a small pore-like opening into the nodule can be seen.

The number of nodular bodies to be found in the large intestine of a pig is variable. The least number counted has been four and the greatest number 63. We believe, however, that many more than this have been present in some of the swine

examined, but no attempt was made to count them. They may occur as isolated nodules scattered here and there in the gut wall or they may occur in clusters of two or more in close proximity. Thus far we have not observed a case where the nodules occurred in the small intestines. In all our cases, the nodules have always occurred in the cecum and colon and even as far back as the rectum. No significant data on the incidence of this lesion are known to the writer. An examination of the postmortem records on swine that have been examined in these laboratories indicates that the presence of small nodular structures in the large intestines is not particularly uncommon.

Discussion

The origin of the epithelial diverticula appears to relate to the embryonal development of the pig. In fact the explanation for their occurrence may be similar to that given by Lewis and Thyng for the intestinal diverticula that occur in pig embryos. They describe the diverticula as outpocketings of the intestinal epithelium that begin as round knobs which may become elongated and detached from the intestine in the form of nodules, strands or cysts. In later stages they acquire a lumen and those found in the distal part of the small intestine appear as flask-shaped, gland-like pockets. According to these authors, the number of "pearls" or "buds" occurring in embryos from 5.5 to 14 mm in length is fewer than in those measuring 14 to 24 mm. With but one exception, the presence of diverticula in the large intestine was not found. The excepted case was that of a 32-mm embryo where a cluster of diverticula occurred near the ileum. It seems reasonable to assume that the outpocketings of epithelium in the large intestine, such as have been described, developed in a manner comparable to the diverticula described by Lewis and Thyng. The presence of the lymphoid tissue in juxtaposition to the epithelium of the nodule is not of unusual significance. The fact that lymphoid tissue develops in relation to epithelial folds and pockets is generally known.

It may be more than of passing interest to point out that in many of the diverticula studied, a process of necrosis was taking place which involved the epithelial structures. A liquefaction of the cryptic contents was also noted. The significance of this occurrence, as it may relate to the more generally recognized inflammatory processes in the large intestines of swine, is not known at the present. Studies are being continued on this phase of the problem.

Reference

[1]Lewis, F. T., and Thyng, F. W.: Amer. Jour. Anat., vii (1908), pp. 505-519.

OBSERVATIONS ON THE USE OF BULBOCAPNINE AS A SOPORIFIC IN HORSES*

By R. S. AMADON *and* A. H. CRAIGE

School of Veterinary Medicine, University of Pennsylvania
Philadelphia, Pa.

The history of the Corydalis cava, the crude drug from which the alkaloid bulbocapnine is derived, presents a curious contrast to that of many of the commoner drugs, whether they be old, time-honored remedies or of only recent development. An ancient folk remedy, evidently of some importance and held in high regard in regions where the herb could be obtained, it has of late become almost unknown and is now scarcely recognized generally as a useful drug. In Matthiolo's *Neu Vollkommenes Kraüter-Buch*, revised in 1678, the crude drug was recommended in wine or syrup in treating pains and aches of the body, as well as in hyperesthesia and excitement.[1] Later there appears a reference which indicates that its use became restricted to veterinary medicine. For Geiger, in his Pharmacopoea Universalis, says, "Hodie (1835) solummodo a medicis veterinariis praescribitur."[2] We have not yet been able to discover precisely what use was made of this drug in veterinary medicine at that time.

One of the earliest reports on the action of the alkaloid bulbocapnine was delivered in 1892, by Mode.[3] Quite an extensive study on several of the alkaloids of the Corydalis cava, including bulbocapnine, carried out on frogs, guinea pigs, rabbits, cats and dogs, was published by Peters.[4] His observations on effects in warm-blooded animals led to the conclusion that bulbocapnine was capable of inducing the following conditions: a cataleptoid state, excessive lachrymation and salivation, slowing of respiratory frequency, and in the cat especially, a weakening of the heart. Furthermore, although it does not appear that he made tests to check the action in horses and cattle, he suggested the possibility of employing this drug in veterinary practice as a sedative in these animals. The only case of the use of bulbocapnine on horses that has come to our attention is a single example in which a relatively high dose, 5 mg per kilogram, was administered intravenously, resulting in a condition of immobility and apathy not unlike the symptoms of clinical "blind staggers."[5]

---

*Presented at the annual meeting of the Pennsylvania State Veterinary Medical Association, Williamsport, October 24-25, 1935. This report covers a division of a project toward the development of a more efficient sedative for the horse; the work is being supported by Merck and Company, Inc.

During the past 30 years, considerable attention has been directed toward explaining the extent and nature of the bulbocapnine actions. Statements apparently paradoxical referring to types of action and curious inconsistencies may be clarified and oriented by keeping in mind the general conclusion of Schaltenbrand and Cobb that small doses exert an akinetic effect, large doses a hyperkinetic, and lethal doses an epileptiform effect.[6] Numerous studies by many investigators tend to illustrate and verify that generalization. Doses in the cat as low as 2 mg per kilogram are capable of eliciting sleepiness,[7] loss of movement,[8] and diminished reflex irritability,[9] together with the cataleptoid rigidity characteristic of the action of that drug; and from the authors' observations it appears that sleepiness often develops in cats with doses slightly lower than those required to produce rigidity. Large doses (10 to 25 milligrams per kilogram) induce complete immobility with abolition of the labyrinthine head position reflex, irritability with tic-like movements, epileptiform convulsions, and a general picture not unlike that of fatal strychnine intoxication.[7, 8] Studies in clinical usefulness, obviously, have been largely restricted to the small doses, with the akinetic and narcotic effects of preëminent significance.

In the neurological clinics bulbocapnine has been reported effective for allaying the tremors in hyperkinesia disturbances. De Jong and Schaltenbrand were able to reduce the amplitude of the tremors in four cases of paralysis agitans and two other cases accompanied by the same type of tremors[10]; in four more cases, three of which showed the typical parkinsonian syndrome, de Jong and Herman compared the antispasmodic potencies of bulbocapnine, scopolamine, atropine, and phenobarbital.[11] Their results indicate that bulbocapnine and scopolamine are decidedly the superior of the group, the other two showing in no case the desired action to a satisfactory degree. It is further stated in this latter report that cases refractory to bulbocapnine are not uncommon. In these instances twice the usual dose may be administered; yet the tremors continue, although the patient appears drowsy. The average dose was stated at 200 mg, and with refractory cases this was increased to 300 mg. Schaltenbrand, in order to gain information regarding subjective symptoms, administered 350 mg to himself, with the effect of producing a sense of moderate fatigue and slowing of physic functions.

Following the rather vague suggestions and inferences in the literature, but largely on the basis of the pharmacological findings in the smaller laboratory animals, it was decided to conduct

a series of experiments on the horse, using bulbocapnine in relatively small doses for its narcotizing action.

Experimental Procedure

The general plan of approach in this study was determined in consideration of the size of the animal used, the nature of drug action expected and, finally, the practical aspect of the problem. Since the actual presence of a depressant action is sometimes difficult to prove when it is mild and the animal normally is quiet, even drowsy, during certain times of the day, it becomes doubly difficult to secure in such an animal as the horse unequivocal objective proof regarding the degree of a depressant effect which would serve the urgent needs of the clinician. The method used in this connection has resolved itself into a combination of objective symptoms and subjective impressions which have been standardized through practice and analysis of evidence. An attempt has been made, in brief, to secure a true picture of the action of bulbocapnine in horses under relatively small doses used subcutaneously, by presenting evidence obtained through several avenues of approach.

Proceeding in this direction, observations were made first on a group of five horses, in which the general nature of the drug action was investigated with particular regard to ratio between size of dose and degree of action. At the conclusion of this preliminary survey a second group of 18 normal horses was used to test some of the conclusions derived from the former. Following this series of experiments, the alkaloid was used in appropriate clinical conditions both alone and in combination with morphine and morphine derivatives. In addition to these, a few tests were performed to determine whether bulbocapnine presents any advantages as an adjunct to chloroform in general anesthesia. This question will be discussed in a subsequent report.

The animals used in the preliminary tests were stabled in box stalls to which they were accustomed from several months of previous occupancy. These were roomy enough to allow freedom to move about at leisure; all experiments were performed in these stalls. During the time of taking observations the stables were closed to visitors and it was usually arranged to schedule these periods so that feeding, watering, and other services of the hostler were not required.

The second group of normal horse experiments was made on animals brought to the hospital for minor operations, but without any demonstrable symptoms indicating nervous abnormality.

During the past 30 years, considerable attention has been directed toward explaining the extent and nature of the bulbocapnine actions. Statements apparently paradoxical referring to types of action and curious inconsistencies may be clarified and oriented by keeping in mind the general conclusion of Schaltenbrand and Cobb that small doses exert an akinetic effect, large doses a hyperkinetic, and lethal doses an epileptiform effect.[6] Numerous studies by many investigators tend to illustrate and verify that generalization. Doses in the cat as low as 2 mg per kilogram are capable of eliciting sleepiness,[7] loss of movement,[8] and diminished reflex irritability,[9] together with the cataleptoid rigidity characteristic of the action of that drug; and from the authors' observations it appears that sleepiness often develops in cats with doses slightly lower than those required to produce rigidity. Large doses (10 to 25 milligrams per kilogram) induce complete immobility with abolition of the labyrinthine head position reflex, irritability with tic-like movements, epileptiform convulsions, and a general picture not unlike that of fatal strychnine intoxication.[7, 8] Studies in clinical usefulness, obviously, have been largely restricted to the small doses, with the akinetic and narcotic effects of preëminent significance.

In the neurological clinics bulbocapnine has been reported effective for allaying the tremors in hyperkinesia disturbances. De Jong and Schaltenbrand were able to reduce the amplitude of the tremors in four cases of paralysis agitans and two other cases accompanied by the same type of tremors[10]; in four more cases, three of which showed the typical parkinsonian syndrome, de Jong and Herman compared the antispasmodic potencies of bulbocapnine, scopolamine, atropine, and phenobarbital.[11] Their results indicate that bulbocapnine and scopolamine are decidedly the superior of the group, the other two showing in no case the desired action to a satisfactory degree. It is further stated in this latter report that cases refractory to bulbocapnine are not uncommon. In these instances twice the usual dose may be administered; yet the tremors continue, although the patient appears drowsy. The average dose was stated at 200 mg, and with refractory cases this was increased to 300 mg. Schaltenbrand, in order to gain information regarding subjective symptoms, administered 350 mg to himself, with the effect of producing a sense of moderate fatigue and slowing of physic functions.

Following the rather vague suggestions and inferences in the literature, but largely on the basis of the pharmacological findings in the smaller laboratory animals, it was decided to conduct

a series of experiments on the horse, using bulbocapnine in relatively small doses for its narcotizing action.

Experimental Procedure

The general plan of approach in this study was determined in consideration of the size of the animal used, the nature of drug action expected and, finally, the practical aspect of the problem. Since the actual presence of a depressant action is sometimes difficult to prove when it is mild and the animal normally is quiet, even drowsy, during certain times of the day, it becomes doubly difficult to secure in such an animal as the horse unequivocal objective proof regarding the degree of a depressant effect which would serve the urgent needs of the clinician. The method used in this connection has resolved itself into a combination of objective symptoms and subjective impressions which have been standardized through practice and analysis of evidence. An attempt has been made, in brief, to secure a true picture of the action of bulbocapnine in horses under relatively small doses used subcutaneously, by presenting evidence obtained through several avenues of approach.

Proceeding in this direction, observations were made first on a group of five horses, in which the general nature of the drug action was investigated with particular regard to ratio between size of dose and degree of action. At the conclusion of this preliminary survey a second group of 18 normal horses was used to test some of the conclusions derived from the former. Following this series of experiments, the alkaloid was used in appropriate clinical conditions both alone and in combination with morphine and morphine derivatives. In addition to these, a few tests were performed to determine whether bulbocapnine presents any advantages as an adjunct to chloroform in general anesthesia. This question will be discussed in a subsequent report.

The animals used in the preliminary tests were stabled in box stalls to which they were accustomed from several months of previous occupancy. These were roomy enough to allow freedom to move about at leisure; all experiments were performed in these stalls. During the time of taking observations the stables were closed to visitors and it was usually arranged to schedule these periods so that feeding, watering, and other services of the hostler were not required.

The second group of normal horse experiments was made on animals brought to the hospital for minor operations, but without any demonstrable symptoms indicating nervous abnormality.

These animals were stabled under conditions similar to those of the former group. The stabling of the clinical cases was sometimes similar to that of the foregoing; often, however, the surroundings presented quite a contrast, even sufficient, in certain cases, to account for discrepancies in the results.

As a regular rule observations were made once or twice, and occasionally oftener, if it was deemed feasible, previous to injection of the drug. Following the administration they were taken at various intervals until the apparent effects had disappeared. Injections were made subcutaneously in the region of the right or left shoulder or lower neck; a 10 per cent solution of bulbocapnine hydrochloride, as prepared by E. Merck, of Darmstadt, was used throughout.

The methods of examination employed in this study have been described in the preceding report.[13] Respiratory rate, when this was utilized, was determined by counting either flank movements or currents of expirium for 60 seconds at a time. The figures occurring in this connection refer to rate per minute, determined in this manner. For description of the other methods employed the reader is referred to the report cited above.

Bulbocapnine in Normal Animals

In this connection a normal horse is considered to be one showing no symptoms of any systemic disturbance on careful examination, in addition to eliciting the nervous reactions and general attitude of the average for the type.

The questions first suggested were concerned with the type, the degree, and the duration of bulbocapnine action in convenient doses. Moreover, if the compound were to prove adequate as a clinical sedative certain other features of the action would demand inquiry. The possibility of a mild, complicating excitant effect occurring, as has been noted with morphine in this animal,[12] was considered; furthermore, procedures were carried out to satisfy the clinician regarding action on respiration, pulse, pupil and peristalsis. The matter of possible analgesic effect was suggested from the positive conclusions Molitor obtained in analgesia studies on cats.[14] And since, as Peters and many others have indicated clearly, the cataleptoid syndrome develops with small doses, an attempt was made to gain information as to degree of this effect engendered in this range of dosage by determining to what extent rigidity ensued in the experiment animals.

To gain information which might be used in answering some of the questions presented, a series of experiments was performed on five horses using doses of bulbocapnine hydrochloride

ranging from 100 to 500 mg (0.25 to 1.40 mg per kg). The animals selected for this introductory study were young active horses, either Thoroughbreds or hunters with a predominance of Thoroughbred breeding; they varied in weight from 350 to 450 kg and in age from two to four years.

TABLE I—*Summary of 17 experiments on 5 horses; 100 to 500 mg bulbocapnine hydrochloride.*

Animal	Bulbocapnine		Pulse[1]	Pupil[2]		Temperature °F[3]	Respiration[4]	Peristalsis[5]	Rigidity[6]	Miscellaneous and General Observations
	Total Dose (mg)	Mg/Kg								
2	100	0.25	− 1	−1	−1	0	− 2	N	−	Sleepiness, but not actually asleep; easily aroused
1	100	0.27	0	+2	+1	−0.4	− 2	N	−	Light sleep when left alone; easily aroused
2	200	0.50	0	−1	0		− 7		−	Light sleep; easily aroused
1	200	0.56	0	0	0	−0.7	− 1	N	−	Sleepiness, not actually asleep
1	200	0.56	− 2	−1	−1	+0.3	− 1		−	Light sleep; not easily aroused
3	300	0.68	+ 2	−1	−1	+0.5	− 1	N	−	Mild sleepiness, not actually asleep; easily disturbed
4	300	0.70	−11						−	Marked drowsiness and light sleep
5	300	0.70	− 8	0	0				−	Sleep; easily aroused
1	300	0.85	0	−1	−1	0	− 1			Sleep, beginning about 7 minutes after administration and lasting about 45 minutes
2	400	1.00	− 2	0	0		−11		−	Distinct sleepiness, dispelled by sounds of feeding preparations
3	500	1.15	0	−2	−1				+	Apparently deep sleep; on touching hind leg animal turned head suddenly to bite
3	500	1.15	0	0	−1		− 3	N	−	Light sleep; easily aroused
4	500	1.18	−14	0	0				+	Moderately deep sleep; easily aroused
5	500	1.18	− 2						−	Deep sleep; not difficult to arouse
2	500	1.25	+ 1	0	0	+0.4	− 4	N	+	Marked somnolence with stiffness of legs; relaxed anus
2	500	1.25	− 4	−2	−3				−	Profound narcosis; not easily aroused
1	500	1.40	− 1	0	0	−0.6	− 5	N	+	Marked narcosis developed within 10 minutes, lasting most intense for 20 minutes more

[1]Maximal variations in frequency per minute, as compared with pre-administrative range (normal, 28-40; Malkmus).
[2]Maximal variations in pupil diameter as compared with pre-administrative range; first figure represents "resting" vertical diameter, second figure represents "light reflex" diameter.
[3]Maximal variations in body temperature, expressed in °F., as compared with pre-administrative range.
[4]Maximal variations in frequency per minute, as compared with pre-administrative range.
[5]Changes in peristaltic sounds and borborygmi classified as: +, increased; —, decreased; N, no change.
[6]Reactions to head-turning and leg-crossing tests indicated by +. Failure to react indicated by —.

It may be stated in general that symptoms of lethargy and somnolence were noted following administrations covering the entire range of dosage. The degree of this depressant effect, as well as its duration, was observed to vary directly with the size of the dose; the lowest doses (100 mg) produced a very mild

action which lasted only 10 or 15 minutes as a marked effect, and such stimuli from the outside as those incident to calling the animal, the rattling of pails and pans indicative of feeding preparation, and similar disturbances, were sufficient to dispel all signs of sleepiness. With these animals the effects consisted in the animal becoming quiet, standing motionless in one place for long periods of time; an appearance of sleepiness would usually set in, characterized by a falling of the head from the natural, elevated position of the active animal to the level of the withers and usually considerably lower, and blinking of the eyelids, which frequently was interrupted by periods of complete closure of the eyes several minutes at a time. This action with these small doses, however, was very easily dispelled, as we have indicated before.

As the dose was increased, several changes took place in this picture of somnolence. The depressant symptoms, which with all doses were well established in 5 to 10 minutes following the subcutaneous administration in the neck or suprascapular region, appeared more pronounced, more prolonged, and more uniform. The 10- to 15-minute period estimated for the 100-mg dose was gradually extended to about 60 minutes attending the 500-mg administration. Depth of narcotising action appeared increased from the greater tendency to keep the eyes closed, the head in an extremely low position, and the hind legs relaxed. At these times the entire animal body showed evidence of a general relaxation, comparable to that of profound normal sleep. Horses have not been observed to lie down under these doses of bulbocapnine.

With the more profound actions it was more difficult to rouse the animals. Loud, sharp and unusual noises were sometimes resorted to in order to bring the animal to a degree of consciousness enabling the attendant to move it and get reactions approximating the normal. In comparing the reflex time by means of such devices as directing a fine stream of water onto the flank and belly region, or by prodding the pectoral region with a blunt stick, the reflexes were found to be considerably retarded and diminished in intensity by bulbocapnine. It may be noted here, moreover, that the horse could always be aroused from the bulbocapnine narcosis, much as the dog can be aroused from morphine depression, if sufficient stimulation from the outside can be applied in the form of slapping and prodding the skin or other forms of rough handling.

The quality and extent of action elicited in those horses studied so far under the action of bulbocapnine can perhaps be best described by means of an illustration.

An experiment, selected at random, and evincing a typical action under 500 mg of bulbocapnine hydrochloride, was reported on the protocol as follows:

10-29-34. Horse 1, 350 kg, Thoroughbred colt, gelding.

11:45 a.m. Animal normally quiet, curious, interested in surroundings. Pulse, 32; respirations, 16; temperature 100.0° F.; pupil, 8-7.

11:50 a.m. Animal is in apparently the same general condition. Pulse, 33; respirations, 15; temperature, 100.4° F.; pupil, 8-7. Intestinal sounds, examined by stethoscope for 5 minutes, average 2 sounds per minute, with an average intensity of 2.

12:07 p.m. Administered subcutaneously 5 cc standard solution of bulbocapnine hydrochloride—500 mg.

12:25 p.m. Appears to be sleeping quietly. Body muscles are somewhat rigid. When the animal is placed in an awkward position (front legs crossed) he stands that way indefinitely. Stroking the hair of the shoulder region results in a reaction, retarded and diminished in intensity as compared with the pre-administration reaction. Pulse, 35; respirations, 14; pupil, 8-7; peristalsis, average 2⅔ sounds per minute, average intensity of 3.

12:42 p.m. A slight noise (dropping a stick onto the brick floor) recalled him from lethargy, and startled him out of the previously mentioned cross-legged position. Still lethargic in appearance, however.

12:50 p.m. Animal active enough to attempt to leave his stall when the door was opened. On being stopped and placed in a secure position, he relapsed again into the general state of narcosis.

1:10 p.m. Animal is standing with head down and in an attitude of general relaxation. Reactions to sounds indicate that he is quite alert.

1:15 p.m. He is standing quieter than he was before administration; but appearance and reactions indicate that he is capable of normal activity. Pulse, 31; respirations, 10; temperature, 99.4° F.; pupil 8-7; intestinal sounds, 1⅔ per minute, with an average intensity of 3.

1:25 p.m. Nibbling odds and ends of hay and straw; evidently completely recovered from narcotising effects of drug.

The general character of the depressant action secured with this drug in horses has been referred to in the last few paragraphs and illustrated in the above protocol. In no case that we know of has bulbocapnine engendered excitement in the horse, as is the case with morphine,[12] many of the morphine derivatives,[13] and scopolamine,[15] all compounds used in man and some of the laboratory animals as subcutaneous narcotics. The effect of bulbocapnine subcutaneously on horses in the doses here might reasonably be described as simulating sleep. The action seems to be one of an augmented fatigue devoid of untoward side

effects and in fact lacking in all effects save those that can readily be attributed to the soporific action.

Through observing the general effects of the drug in this first series of five horses and repeating the 500-mg dose in 18 more animals of the second series, an attempt has been made to secure a composite picture of this phase of the action. In tables I

TABLE II—*Summary of 25 experiments on 23 horses; 500 mg bulbocapnine hydrochloride.*

Animal	Type	Weight (kg)	Dose mg/kg	Pulse[1]	Pupil[1]		Rigidity[1]	Observations on General Action	Approximate Duration of Action (minutes)[2]
1	Thoroughbred	350	1.40	− 1	0	0	+	Marked narcosis; rather easily aroused	80
2	Thoroughbred	400	1.25	− 4	−2	−3	−	Profound narcosis; not easily aroused	50
2	Thoroughbred	400	1.25	+ 1	0	0	+	Marked somnolence with stiffness of the legs	70
3	Thoroughbred	450	1.15	0	−2	−1	+	Apparently deeply somnolent; easily dispelled by touching skin	60
3	Thoroughbred	450	1.15	0	0	−1	−	Light sleep; easily aroused; rigidity of neck	60
4	Thoroughbred	425	1.18	−14	0	0	+	Moderately somnolent; easily aroused; rigidity of fore quarters	70
5	Hunter	425	1.18	− 2			−	Narcosis distinct; easily aroused; no rigidity	70
6	Hunter	650	0.77	− 5	−1	−1	−	Narcosis moderate; easily aroused	30
7	Polo pony	350	1.40	− 1	−1	−2	(+)	Narcosis deep; not easily aroused; trace of rigidity	70
8	Polo pony	350	1.40	− 4	−1	−4	−	Narcosis deep; not easily aroused	60
9	Hunter	675	0.74	0	0	−1	−	Narcosis distinct; easily aroused	30
10	Thoroughbred	250	2.00	+10	0	0	−	Narcosis profound; not easily disturbed	80
11	Thoroughbred	400	1.25				−	Narcosis distinct; easily disturbed	40
12	Hunter	500	1.00	− 1	0	−1	−	Narcosis distinct; easily disturbed	70
13	Hunter	550	0.90	− 2	−1	0	−	Narcosis distinct; rather easily disturbed	60
14	Hunter	500	1.00	− 1	0	−1	−	Narcosis distinct; rather easily disturbed	70
15	Polo pony	350	1.40	− 8	−2	−2	+	Narcosis distinct; partly aroused by handling	80
16	Polo pony	350	1.40	0	−3	−2	(+)	Narcosis distinct; not easily aroused	70
17	Hunter	625	0.80	− 2	−1	−1	−	Narcosis mild but distinct; easily aroused	40
18	Hunter	600	0.83	−11	−2	−1	−	Narcosis mild but distinct; easily aroused	60
19	Thoroughbred	400	1.25	+ 4	−2	−3	(+)	Narcosis profound; quite easily aroused	60
20	Hunter	450	1.10	0	−2	−2	(+)	Narcosis mild but distinct; easily dispelled	60
21	Hunter	575	0.87	0	−2	0	−	Somnolent; rather easily aroused	40
23	Hunter	500	1.00	− 1	−2	−1	(+)	Marked narcosis; not easily aroused	50
25	Standard-bred	375	1.35	0	−2	−1	(+)	Moderately deep narcosis easily aroused	70

[1]See corresponding notes in table I.
[2]Figures in this column represent the number of minutes from time of administration until animal appears completely normal and shows no evidence of drug effect (depression).

and II an estimation of the degree of action is presented for each experiment performed. The criteria upon which this decision was based were the state of the animal's activity, the position of the head, the appearance of the eyes, the state of relaxation of the hind limbs and body in general, and finally, the ease of reversal of these symptoms through handling. With such a group of conditions to consider it was deemed feasible to evaluate them *in toto* and to base the final estimation upon the preponderance of evidence.

As it is extremely difficult to secure information of an absolute nature regarding total sedative effect, so it is equally hazardous to attempt to determine the actual length of time such an effect is present. The experiment reported above demonstrates that the horse, during the later stages of the action, is capable of functioning in an apparently normal manner when permitted to move about, but when restrained he again elicits distinct symptoms of the soporific drug action. This observation, further complicating the problem, tends to indicate that the conclusions regarding duration of depression obtained from these studies on normal animals in quiet, restricted quarters would be inaccurate when applied to the same animals suffering from a form of bodily irritation or quartered in a large clinic hall where disturbances of various kinds are almost constantly present. Nevertheless, an attempt has been made, for practical reasons, to record the duration of the stage of pronounced somnolence in all animals under 500 mg of bulbocapnine hydrochloride, realizing at the same time that the exact point at which this degree of action is terminated depends largely upon three factors subject to wide variation, namely, the animal and its general stability, the number and nature of outside disturbances, and the judgment of the observer. On this basis, then, the estimated duration of the lethargic symptoms for each of the 23 normal animals administered 500 mg of bulbocapnine hydrochloride is presented in table II.

Regarding miscellaneous observations on the experiment horses under bulbocapnine influence, it may be concluded that a slight rigidity, particularly noticeable in the muscles of the legs and neck, was the only effect not directly ascribable to the central depression. The procedure employed here to detect the presence of rigidity was that of turning the head to one side and moving the animal slightly so that the legs came into an awkward position, such as wide apart at the feet, or cross-legged. When the animal maintained this abnormal and ordinarily uncomfortable position for several minutes, evincing no signs of discomfiture,

it was concluded that the previously mentioned cataleptoid rigidity was present. In cases where the effect was only partial, as with only the head position maintained, the legs refusing to tolerate the imposition, and in certain instances only a marked stiffness of those parts receiving particular consideration, the conclusion was—incomplete rigidity. In almost all cases subjected to 500 mg of the alkaloidal ester some evidence of muscular stiffness was noticed; but in tables I and II the above classification is followed, permitting instances of mild stiffness, undoubtedly identical in nature, to be classed as negative.

TABLE III—*Bulbocapnine analgesia in horses (skin-pressure tolerance; as measured by special forceps and recorded in number of notches traversed on ratchet).*

ANIMAL	TOTAL DOSE (MG)	DOSE MG/KG	PRE-ADMINISTRATIVE READING (NOTCHES)	POST-ADMINISTRATIVE READINGS (NOTCHES)		CHANGE* (NOTCHES)
				20 MIN.	45 MIN.	
2	100	0.25	8	8	8	0
2	500	1.25	4	4	4	0
2	500	1.25	5	6	5	+1
3	300	0.68	8	8	7	−1
3	500	1.10	4	4	4	0
21	500	0.87	4	4	4	0
23	500	1.00	3	3	2	−1
25	500	1.35	3	2	2	−1

*An increased pressure tolerance, equal to that accompanying an increase of 3 or more notches on the ratchet of the special forcep when pinching the skin before and after administration of the drug in question, was not evident in any of the experiments cited here (see reference 13).

Analgesia experiments were performed following the skin pinching method described in another report.[13] The results of the eight experiments summarized in table III failed to demonstrate the analgesic properties pointed out by Molitor. That investigator indicated, moreover, that bulbocapnine is markedly inferior to morphine in this property; perhaps this observation will serve to explain the negative results secured by the skin-pinching method on horses. In the section concerned with clinical trials, however, a pair of experiments, one using bulbocapnine with morphine and one with bulbocapnine alone (1 and 2), tends to corroborate the opinion that bulbocapnine is decidedly inferior to morphine as an analgesic.

Observations on pulse and respiratory frequency, pupil effects, body temperature, and peristalsis are tabulated in tables I and II. The absence of change in peristaltic sounds may be con-

trasted to the effect of morphine on the same reaction. It will be noted that other changes are generally slight and usually in the direction of a depressant effect. The respiratory frequency, however, was invariably diminished, which indicates that the minimal frequency always came following drug administration and onset of symptoms.

Bulbocapnine in Combinations

The possibility of securing more pronounced depressant action by combining bulbocapnine with morphine, as well as to augment the analgesic properties of the former, motivated a short series of tests on a few simple combinations. The results of these tests seem to indicate that there is no strikingly obvious synergism to be expected in the combination. The most apparent general symptoms following these administrations tended to signify that the usual bulbocapnine depression is followed in due course by typical morphine excitement. To arrive at this opinion the following quantities of each ester were used combined in single tests:

	(1) (2) (3) (4)
Morphine hydrochloride	200, 260, 325, 325 mg
Bulbocapnine hydrochloride	200, 200, 300, 500 mg

Also dilaudid, 65 mg, and bulbocapnine hydrochloride, 300 mg, were combined in a single test.

It is not considered necessary at this time to discuss further this group of tests or to dwell upon the details. Suffice it to say that with the higher doses the symptoms of depression lasted about 20 to 30 minutes, which corresponds to the average duration of the stage of pronounced bulbocapnine depression. At the end of the time restlessness gradually replaced the somnolence, advancing to the typical stage in a few minutes. The effect of dilaudid in this combination does not differ materially from that of morphine in manner of action, although the type of excitement is somewhat different, as has been indicated in the preceding report.[13]

Two experiments in which bulbocapnine, subcutaneously, was combined with fluid extract of cannabis sativa, intravenously, in the quantities 0.6 gm and 7.5 cc, and 0.3 gm and 15 cc, respectively, failed to indicate that bulbocapnine reduced significantly the heightened reflexes of cannabis action, or markedly increased the cerebral depression. The appearance and reactions of the test animals under the effect of this combination was scarcely different from what would be expected on superimposing typical actions of the individual drugs. Obviously the combination pre-

sents certain practical disadvantages; consequently the matter was not studied at this time beyond these two experiments.

CLINICAL STUDIES

In conjunction with the preliminary experimental studies, which have been discussed in the former portion of this report, a series of clinical trials was arranged to gain information on the actual usefulness of bulbocapnine under purely clinical conditions. Quite naturally the number of such cases was restricted by the availability of suitable clinical material, since it was not our privilege in this introductory period of experimentation to apply the drug as a routine measure. Consequently, at this time the record embraces a little group of generally typical cases treated with bulbocapnine, usually in combination with one of the opiates, to establish by this means a basis for future, more extensive, clinical investigation.

In view of the small number and the variety of cases under consideration, no attempt was made to present the material otherwise than in a serial description of the experiments conducted. Where certain physiological disturbances are alluded to, the diagnosis was made by experienced clinicians of the veterinary staff at the University of Pennsylvania.

Case 1: 10-15-34. Gonitis. Hunter, 450 kg, female, sanguine temperament.

This animal had been stabled at the hospital for several weeks, apparently normal. Suddenly she began showing marked symptoms of pain, with groaning, restlessness and a tendency to assume unusual attitudes while standing and to roll and throw herself about when allowed sufficient stall space. A subcutaneous injection of bulbocapnine hydrochloride, 500 mg, seemed to diminish the restlessness somewhat, but pain symptoms continued to be evident throughout the period of drug action. A state of light sleep, constantly interrupted and dispelled by obviously painful disturbances, persisted about 30 minutes. The "colicy" symptoms returned to their former intensity about 45 minutes after the administration and did not abate until several hours later.

Case 2: 10-16-34. Gonitis. Same animal as case 1, one day later.

Again the next day, after a quiet night, the horse began showing the same kind of symptoms as of the previous day and apparently of the same intensity. A subcutaneous injection of bulbocapnine hydrochloride, 500 mg, and morphine hydrochloride, 200 mg, simultaneously, was followed by a period of quiet, restful sleep, with general relaxation, which lasted about one hour, after which the animal began to evince symptoms of mild pain, together with some drowsiness. Apparently the intense pain did not return for several hours. The case was diagnosed on autopsy a few days later as gonitis of the left hind limb with an acute, sero-purulent arthritis and tendo-vaginitis of the hock.

Case 3: 3-14-35. Azoturia. Draft animal, 550 kg, female, lymphatic temperament.

When brought into the hospital the animal was moving about restlessly, evidently suffering considerable pain. The urine was black.

After being given subcutaneously a solution of bulbocapnine hydrochloride, 500 mg, and morphine hydrochloride, 140 mg, simultaneously, the mare became quiet, lay down, and enjoyed a light sleep. At 45 minutes after injection of the drugs she was still resting quietly, although beginning at this time to look rearward as though the damaged posterior tissues were commencing to provoke pain.

Case 5: 3-21-35. Colic. Thoroughbred, 300 kg, female, sanguine temperament.

The mare appeared severely colicy—kicking, perspiring, and with markedly injected mucous membranes. After introducing subcutaneously a solution of bulbocapnine hydrochloride, 500 mg, and dihydromorphine hydrochloride, 100 mg, simultaneously, she became quiet and went to sleep. She remained in this condition, scarcely moving, for the next hour, at the conclusion of which consciousness began to return and with it an interest in the feeding preparations then in progress. The colicy symptoms did not return.

Case 6: 4-5-35. Operation. Thoroughbred, 450 kg, castrated male, sanguine temperament.

To prepare this animal for a laryngotomy, to be performed in the standing position, a subcutaneous injection of bulbocapnine hydrochloride, 500 mg, and dihydromorphine hydrochloride, 100 mg, simultaneously, was made about 20 minutes before administration of the local anesthetic to the skin of the throat region. Pronounced symptoms of depression became evident, with sleepiness and general relaxation, but when the operative procedure was commenced the animal suddenly emerged from the depression, becoming excited and active, to an extent that chloral hydrate was ordered by the surgeon.

Case 7: 4-5-35. Colic. Thoroughbred, 250 kg, female, sanguine temperament.

The filly was showing symptoms of severe colic, with restlessness, rolling, and kicking at the abdominal region. A subcutaneous injection of a solution of bulbocapnine hydrochloride, 300 mg, and dihydromorphine hydrochloride, 60 mg, simultaneously, was followed by sudden abatement of these symptoms. Two minutes later, she rose to her feet, and six minutes after that she was standing with head down, eyes closed, and the usual relaxation of sleep. About 75 minutes later, she began to emerge from the somnolence, with an appetite for hay and no evidence of colic.

Case 8: 4-5-35. Operation. Thoroughbred, 550 kg, male, sanguine temperament.

Dr. William J. Lee, of the staff of the Veterinary Hospital, made this test in the course of the work of his ambulatory clinic. He prepared the animal for laryngotomy in the manner outlined for case 6, using a local anesthetic (procaine) subcutaneously in the region where the skin was to be cut, as well as on the mucous membranes to be encountered. In reporting the outcome he indicated that the animal stood quietly throughout the entire period of the operative procedure, in a state of partial general relaxation, and apparently distinctly narcotised. No further sedative was required, as the action of the combination was judged completely satisfactory; and according to the stable man attending the horse, the animal was still somewhat duller than usual on the following morning.

Case 9: 4-6-35. Operation. Hunter, 550 kg, castrated male, sanguine temperament.

This animal was prepared for laryngotomy in the same manner as was described for case 6. During the major part of the period of operation, the animal stood quietly with a sleepy, relaxed appearance.

On two or three instances, however, when painful manipulations were begun, it suddenly became active, even excited, for the moment, again relaxing into the general lethargic attitude.

Case 10: 4-6-35. Operation. Same animal as that under consideration in case 7.

To prepare the filly for an abdominal laparotomy the same combination used in case 6 was administered in conjunction with a local anesthetic at the site of operation. The animal was cast and the operation, which lasted 54 minutes and consisted of the removal of a large tumor from the abdominal cavity, was performed without a struggle, or any response on the part of the animal until almost time for dressing the wound, with a single notable exception. At the time of cutting the peritoneum, the animal evinced rather marked symptoms of pain. During the period of applying the dressing, she became more active, emerging from the deeper stage of the action, although she remained mildly lethargic at least a couple of hours longer.

Case 11: 4-16-35. Operation. Hunter, 600 kg, castrated male, sanguine temperament.

Another ambulatory clinic test, in every requirement similar to case 7. In this case, also, Dr. Lee declared himself satisfied with the degree and quality of the depression obtained.

Case 12: 4-17-35. Operation. Hunter, 450 kg, female, sanguine temperament.

A hospital laryngotomy similar in preparation and operative treatment to case 6. The animal, although apparently profoundly narcotised, upon commencement of operative procedure, became suddenly excited and vaulted out of the stall. Returned to the stall she remained quiet, in evident depression throughout the remainder of the period of operation and post-operative treatment.

Case 13: 4-22-35. Azoturia. Draft, 650 kg, castrated male, lymphatic temperament.

Prior to drug administration the animal was showing evidences of severe pain and central disturbance, in the form of rolling and other restless gestures, groaning, and labored breathing. Following the subcutaneous injection of bulbocapnine hydrochloride, 500 mg, and dihydromorphine hydrochloride, 100 mg, simultaneously, the horse became quiet and even enjoyed a light, rather fitful, sleep. Handling by the clinician, about 50 minutes after drug administration, tended to arouse the animal from its lethargy, but it continued to rest quietly for some time after this.

Case 14: 4-25-35. Operation. Hunter, 600 kg, castrated male, sanguine temperament.

The animal was prepared for a laryngotomy by administering, in the manner already described, bulbocapnine hydrochloride, 900 mg, and dihydromorphine hydrochloride, 100 mg. An excitable animal, this application induced a degree of distinct depression accompanied by lowering of the head, closing the eyes and general quietness, which continued as long as the animal was not subjected to painful manipulations. Nevertheless each move made either to prepare him further or to perform surgical procedures was attended by reversal of action, with excitement and restiveness that seemed to dispel the somnolence in a large measure.

Case 15: 5-9-35. Operation. Hunter, 400 kg, female, sanguine temperament.

A laryngotomy, similar in all general respects of preparation and treatment to that of case 6, was performed on this mare, commencing

34 minutes after injection of the drugs. Although she had elicited marked depression during the 25 minutes immediately preceding this time, she emerged from the lethargy and appeared excited when operative procedure was begun. Signs of depression, although they continued to be manifest, were not pronounced throughout the remainder of the period of operation.

Case 16: 5-28-35. Tetanus. Hunter, 500 kg, female, sanguine temperament.

This case appeared typical of advanced tetanus, with head and neck extended, nostrils dilated, staring eyes, and tail protruded. A subcutaneous administration of bulbocapnine hydrochloride, 500 mg, and dihydromorphine hydrochloride, 100 mg, in aqueous solution simultaneously, appeared to have the effect of diminishing the severity of the symptoms to some extent. The facial expression relaxed considerably; the nostrils returned to their normal state and the eyes were closed. The tail was lowered about half-way and the horse assumed a very sleepy appearance. Outside disturbances, such as unusually loud sounds or handling the animal, were sufficiently stimulating to dispel the symptoms of depression and reëstablish the former state.

Case 18: 5-29-35. Tetanus. Same animal as that referred to in case 16.

The horse's condition appeared about the same as that of the previous day, before the drug combination was administered. Bulbocapnine hydrochloride, 1 gm in solution, was injected subcutaneously. About 12 minutes later, the animal seemed much more relaxed, with the head lowered, the nostrils relaxed, and the eyes quite sleepy looking. Unusual outside stimuli were capable of dispelling these symptoms of depression. Incidentally, at this time it was noticed that saliva was issuing from the mouth, trickling drop after drop. This improved condition remained equally pronounced for about one hour, after which it gradually returned to that of the pre-administrative period, taking about three hours to emerge completely from the visible effects.

Recapitulating, it will be observed that bulbocapnine, either alone or in combination with morphine or dihydromorphine, has been used clinically upon 16 cases, all administrations being subcutaneous. Of this number there were two cases of severe abdominal colic treated with bulbocapnine in combination with dihydromorphine, which showed prompt relief from pain and narcosis. One case of painful gonitis, treated with bulbocapnine alone, did not show nearly so satisfactory an effect as when morphine was combined with bulbocapnine. There were two azoturia cases; both appeared distinctly improved in temporary condition following the administration. The two experiments with the tetanus syndrome serve to illustrate the soporific qualities of the drug, yet the degree of this action was scarcely adequate to recommend its expediency as a routine clinical measure in cases of this sort. The beneficial effect at best seems transient, the animal returning, in a couple of hours at most, to its former state.

The remaining eight cases here included were those of preparation for operative procedures, in which the soporific and anal-

gesic properties of the combination were employed in conjunction with the use of a local anesthetic at the site of operation. On reviewing and comparing the results of these eight experimental cases, it may be remarked that the drug effect appeared to vary considerably. Obviously we cannot attempt at this time to account for this variation in anything even approaching a complete and final analysis, but there seem to be two observations meriting some attention in this connection.

FIG. 1. Attitude of a horse under bulbocapnine action. Note the lowered head and sleepy eyes. This animal received 500 mg of bulbocapnine hydrochloride subcutaneously, 20 minutes before this picture was taken.

As has been indicated in another portion of this report, the most pronounced stage of bulbocapnine depression appears to develop soon after administration and continues, on an average and with the dose here employed, not more than a half-hour. At the conclusion of this period of more profound action there follows one of less pronounced depression which remains a variable length of time (at least 30 to 60 minutes, according to our observations) but the degree of depression is so mild that it can be dissipated very easily. It is quite probable that in some of these cases the necessary operative procedure was not begun early enough to permit of the more painful and otherwise stimulant activities being completed while the stage of depression was deepest.

Furthermore, individual tolerance undoubtedly has some bearing on the variability, both metabolic tolerance to the drug and

also sensitivity to pain and general stimuli. The remark was made by one of the clinicians that animals of sanguine temperament seem to respond more satisfactorily to bulbocapnine than do those of more lymphatic temperament. We are not prepared, however, either to dispute or to accredit this observation. But it seems evident that careful timing of the administration, so as to bring the earlier stages of the operation to pass during the period of most profound action, is of prime importance toward securing satisfactory depression.

Another comment made by the clinician should be included in this discussion of the clinical studies. A marked tendency for horses to walk stiff-legged for several hours and even on the following day after using bulbocapnine on them has been noticed. This has been regarded as a manifestation of the cataleptoid rigidity of this report, a characteristic effect associated with this drug as long as its pharmacological action has been known. In no case coming to our attention has this stiffness in horses been so pronounced, with the dose we have here employed, to interfere with the usefulness of the remedy.

SUMMARY

From general pharmacological studies on the smaller laboratory animals and clinical observations on man, bulbocapnine appears to possess properties that suggest its possible usefulness in veterinary practice as a sedative for horses. It has the effect of narcotising, of inducing a type of muscular rigidity referred to as "cataleptoid," and of inducing at least a mild degree of analgesia, without evidence of undesirable side effects and apparently with a wide therapeutic ratio. These general qualities in the substance have led to conducting the series of experiments here reported.

Observations on the effect of doses ranging from 100 to 500 mg as a total dose in five horses and 500 mg in 18 more horses have indicated that the drug is capable of inducing a marked and even profound narcotising effect, together with distinct muscular rigidity in many cases. Experimentally it was not possible to show an analgesic effect comparable to that of 0.2 mg/kg morphine hydrochloride with the doses here employed and the method used to demonstrate this action. A clinical test tends to support the conclusion obtained from the experimental studies that bulbocapnine is decidedly inferior to morphine as an analgesic, although far superior as a calmant and hypnotic.

A few experiments with bulbocapnine and morphine in normal animals failed to reveal any apparent synergism in general

action. Nevertheless the former was combined with morphine and derivatives of morphine in analgesic doses in a series of clinical studies. The opiate was used mainly as an analgesic. The cases consisted of abdominal colic, 2; gonitis, 1; azoturia, 2; tetanus, 1; and operations, 8, on which latter group the combination was used as a calmant in conjunction with a local anesthetic at the site of operation.

The results in most of the cases were satisfactory. The restlessness and pain of colic, gonitis and azoturia were either dispelled completely or almost completely; the final outcome was largely dependent upon existing conditions. In the cases where the combination was used as a calmant for operation the effect was sometimes sufficiently depressant to permit the operator to proceed without resistance on the part of the animal. In a few cases, however, the animals reacted to painful procedures by emerging from the lethargic somnolence and exhibiting for a short time the usual symptoms of fear and excitement.

The number of tests here reported is not sufficient to enable us to estimate the possible usefulness of bulbocapnine to the veterinary profession in the future. Plans and experiments are now under way for extending this study and for augmenting the collection of cases now available.

REFERENCES

[1]Verzascha, B.: Neu Vollkommenes Kraüter-buch von Petro Andrea Matthiolo. (Basel, 1678.)
[2]Geiger, P. L.: Pharmacopœa Universalis (Heidelberg, 1835), ccxvi.
[3]Mode, A.: Über die physiologischen Eigenschaften des Bulbocapninum hydrochloricum. (Inaugural dissertation. Berlin, 1892.)
[4]Peters, F.: Pharmakologische Untersuchungen über Corydalisalkaloide. Arch. f. exp. Path. u. Phar., li (1904), p. 130.
[5]Kok, I., and van Harreveld, A.: Über Bulbocapnine—Intoxikation und Dumm Koller des Pferdes. Deut. Tierärzt. Wchnschr., xlii (1934), pp. 51 and 813.
[6]Schaltenbrand, G., and Cobb, S.: Bulbocapninkatalepsie und Localanästhesie bei Grosshirnoperationen in Tierversuch. Arch. f. d. ges. Physiol., ccxviii (1928), p. 475.
[7]Amadon, R. S., and Craige, A. H.: An investigation into the ratio between the effective and lethal doses of bulbocapnine in the cat. Jour. Phar. & Exp. Therap., liv (1935), p. 334.
[8]Schaltenbrand, G.: Action of bulbocapnine on the intact cat. Arch. f. d. ges. Physiol., ccix (1925), p. 623.
[9]Schaltenbrand, G.: Action of bulbocapnine on the spinal cord and the decerebrated cat. Arch. f. d. ges. Physiol., ccix (1925), p. 643.
[10]de Jong, H., and Schaltenbrand, G.: Die Wirkung des Bulbocapnins auf Paralysis Agitans und andere Tremorkranke. Klin. Wchnsch., xlv (1924), p. 2045.
[11]de Jong, H., and Herman, W.: The action of Bulbocapnine in three cases of paralysis agitans and one case of tremor of paralysis agitans type. Arch. Neurol. & Psych., i (1926).
[12]Guinard, L.: Effects apparents du Morphinisme chez les solipèdes. Encyclopédie Cadéac Vétérinaire, Thérapeutique et Parmacodynamie, 401 (1899).
[13]Amadon, R. S., and Craige, A. H.: The actions of morphine on the horse: preliminary studies: Morphine, dihydromorphine, codeine, dihydropseudocodeine, dionine, and dihydromorphinone (Dilaudid).
[14]Molitor, H.: Further Studies on Premedication with Special Reference to Bulbocapnine. Congress of Anesthetists, June 10, 1935, Atlantic City, N. J.
[15]Fröhner, E.: Arzneimittellehre für Tierärzte. (12th ed., Stuttgart, 1921), lxxxix.

ABSENCE OF THE PERICARDIUM IN DOGS

Report of Two Cases*

By CARL F. SCHLOTTHAUER *and* LEONARD K. STALKER

The Mayo Foundation, Rochester, Minnesota

The finding of two cases of congenitally defective or ruptured pericardium in the dog is thought to be so uncommon as to merit a report of these cases. In reviewing the available literature we failed to find mention of a similar condition occurring in an animal.

The cases we wish to report were discovered during routine necropsy of 155 dogs. It has been observed in only two other dogs in this institution. None of these dogs manifested symptoms which might indicate such a defect or lesion.

REPORT OF CASES

Case 1: A male, short-haired mongrel dog which had been admitted to our kennels as an adult in May, 1930, was destroyed by ether inhalation, December 17, 1935. At this time he was in a good state of nutrition and appeared to suffer no disability because of the condition of the pericardium.

Necropsy revealed the heart to be lying free in the mediastinum. Only small fragments or a collar of pericardium was present at the base of the heart. The heart appeared somewhat enlarged and atonic. The pericardium grossly appeared as if it had been ruptured and had healed; however, there was no other evidence of trauma. If this was a true rupture of the pericardium, it must have existed for more than five years, because the dog could not have suffered such a traumatic accident while in our kennels. If it was a congenital defect, he of course had had it all his life.

Case 2: An adult, male shepherd, which was not known to have suffered any traumatic accident, was destroyed by ether inhalation, October 22, 1935. This was done by placing the dog in an illuminated cabinet and by introducing the ether as a spray with an atomizer. It was noted that when this dog had been

*Received for publication, February 10, 1936.

given less than the usual amount of ether necessary for anesthesia, he died rather suddenly.

When the thorax was opened at necropsy, the heart was seen to be lying free in the mediastinum and it was not enclosed in the pericardium. Only a small collar of pericardium was present at the base of the heart; this was about 1 cm in width and appeared to be retracted posteriorly. The heart was widened and was much more atonic than normal.

Gross examination of the pericardium in this case indicated that the condition was probably one of long standing and that it was a traumatic rupture rather than a congenital defect. It appeared as if the pericardium had ruptured anteriorly and was retracted posteriorly; the retracted portion then became contracted and thickened.

These pericardial defects probably account for the lateral expansion and flabby, atonic condition of the heart in each case. It is possible also that this defect played an important part in the sudden, unexpected death of the dog in case 2.

NATURAL AND EXPERIMENTAL INFECTIONS OF DOGS WITH EIMERIA CANIS*

By RALPH F. HONESS, *Laramie, Wyo.*
University of Wyoming

The diagnosis of coccidiosis, resting, as it does, principally upon the discovery of the oöcyst in the feces of the suspect, presents no difficulty to the clinician. However, the identification of the species from the available material is always a tedious task, the results of which would in no way change the therapeusis. It was, no doubt, this fact which prompted Skidmore and McGrath[1] to write:

> Perhaps coccidia belonging to the genus *Eimeria* would be found more often in dogs if the practice of sporulating the intestinal contents of these animals were carried out.

The afore-mentioned authors were the first to observe canine coccidiosis in America due to infection with *Eimeria canis* Wenyon. They give an orderly account of the literature relating to the species of coccidia infecting the dog. Becker[2] gives a concise review of the knowledge of *Eimeria* infecting the dog and cat.

Dr. A. M. Lee, of the Department of Veterinary Science and Bacteriology, on February 22, 1934, found a coccidium in the feces of a dog under such circumstances that the identity of the

*Received for publication, January 27, 1936.

species became desirable. He submitted the coccidium to the parasitology laboratory for identification.

When first examined, all of the oöcysts were sporulated. They were colorless, ellipsoidal, but not symmetrical. Nearly all of them were curved more on one side than on the other. In several instances the oöcysts were paired, with the less curved surfaces together. An extraresidual body was present. The sporocysts were elongated, each with two sporozoites and an intraresidual body.

The oöcysts measured 17.61 to 19.30μ by 10.80 to 12.10μ. The average size of the sporocyst was 10.4 by 5.8μ. The oöcysts from the first dog to be infected in the feeding experiment given here measured 15.77 to 26.15μ by 10.37 to 16.60μ. The average was 17.76 by 12.01μ. The appearance of the oöcysts was identical with those fed.

Sporulation at room temperature required about three days in shallow cultures. There were always a few sporulated oöcysts to be found in recently voided feces.

A comparative study of the oöcyst shows that it differs from *Eimeria vulpus* Galli-Valerio in the shape of the oöcyst and the size of the sporoplast, and from *Eimeria mesnili* Rastegaieff in that an oöcystic body is present. When reference is made to table I, it will be seen that the oöcysts in question do not correspond exactly with the measurements given for *E. canis*. However, since Boughton[3] has shown that the validity of measurements as a sole criterion for separating species is open to question, and, since it agrees with *E. canis* in other characters, the writer is of the opinion that it belongs to this species.

The viable oöcysts were kept at 25° C. for four days. Two young dogs were then fed a small number of oöcysts on seven consecutive days. From fecal examinations one dog was known to be free of coccidia and the other was known to be infected with an *Isospora sp.*

On the eight day after the first feeding, there appeared in the feces of the first dog numerous oöcysts of *Eimeria canis*. It was not until the 17th day after the first feeding, or ten days after the last feeding, that oöcysts of *E. canis* appeared among the oöcysts of the *Isospora sp.* in the feces of the second dog.

The infection was followed for two weeks, during which time the production of oöcysts continued. At no time did the dogs show effects of the infection.

REFERENCES

[1]Skidmore, L. V., and McGrath, C. B.: Canine coccidiosis due to *Eimeria canis*. Jour. A. V. M. A., lxxxii (1933), n.s. 35 (4), pp. 627-629.
[2]Becker, E. R.: Coccidia and Coccidiosis of Domesticated, Game and Laboratory Animals and of Man. (Collegiate Press, Inc., Ames, Iowa, 1934).
[3]Boughton, D. C.: The value of measurements in the study of a protozoan parasite *Isospora lacazie* (Lobbe). Amer. Jour. Hyg., xi (1930), pp. 212-226.

CHOLELITHIASIS IN DOGS

Report of Two Cases*

By CARL F. SCHLOTTHAUER *and* LEONARD K. STALKER
The Mayo Foundation, Rochester, Minnesota

Friedberger and Fröhner[1] stated that, "the occurrence of gall-stones and their subsequent morbid condition are, among animals, clinical rarities." They mentioned that in domesticated animals, gall-stones occur most frequently in the dog and ox. Law[2] stated that "gall-stones are found in ruminants, omnivora and carnivora, less often in the horse." Hutyra and Marek[3] mentioned that, "gall-stones are found most frequently in the horse and ox, more rarely in the dog and exceptionally in the cat, pig and sheep."

From the foregoing it appears that gall-stones may occur in all species of domesticated animals, but that they probably are of infrequent occurrence and have been observed most frequently in the ox, horse and dog. Only two references to the incidence of their occurrence could be found. Law stated that biliary material varying from sand to casts is found in one of every thousand or more horses. Totten[4] observed gall-stones in 23 (0.4 per cent) of 5,725 cattle slaughtered in packing establishments in South Saint Paul, Minnesota.

Reports of cases of gall-stones in domesticated animals are not numerous and, as will be noted, in most of them the condition was observed in horses. Faulkner,[5] Birnbaum,[6] Averous,[7] Trolldenier,[8] Dieckerhoff,[9] Verheyen,[10] Rigot[11] and Zundel[12] reported the occurrence of gall-stones in horses, Mersner[13] and Totten observed gall-stones in cattle, and Kitt[14] found a calculus in the gall-bladder of a fowl. The size and number of gall-stones observed in individual animals varied greatly. The size varied from that of a sand particle to a gall-stone weighing several pounds. Averous reported that he observed a stone weighing 9 ounces (255 gm) in the biliary duct of a horse, in addition to thousands of other stones ranging in size from that of a sand particle to that of an almond. The color and consistency of gall-stones likewise varies. Such stones may be red, yellow, or green and soft, semi-solid, or hard and brittle.

Gall-stones in animals are generally attributed to the formation of a nucleus of bile pigment, blood, mucus, parasites, or parasite ova within the gall-bladder. Gall-stones are then formed

*Received for publication, February 10, 1936.

by a deposit of cholesterin crystals, bile pigments, calcium, and other inorganic salts around this nucleus.

Gall-stones may be present without causing a definite clinical syndrome. If they are very small or are confined within the gall-bladder, they may cause only slight, if any, digestive disturbance or pain. However, true colic caused by gall-stones has been observed in the horse by Averous, Trolldenier, and by Sommermeyer,[15] and in the ox by Marcus.[16] It would be difficult, however, definitely to diagnose the presence of gall-stones in a large animal in the absence of obstruction and jaundice. The roentgenogram would be of help in diagnosing this disease in small animals.

Because of the apparently infrequent occurrence of gall-stones in domesticated animals, we are reporting two cases we have observed. Both cases were discovered during routine necropsy

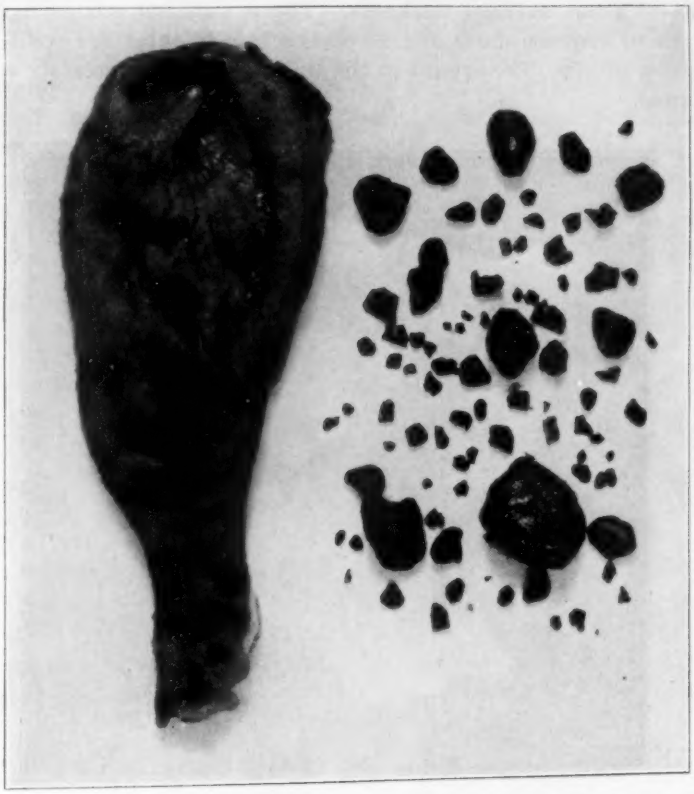


FIG. 1. Distended, firm gall-bladder and the greenish-black stones removed from it.

of 155 dogs. These dogs did not manifest symptoms of disease of the gall-bladder before death and the presence of gall-stones was not suspected.

Report of Cases

Case 1: An aged, male, mongrel shepherd dog was destroyed with ether and necropsy was performed. He was in an excellent state of nutrition and appeared to be in good health. Symptoms referable to disease of the gall-bladder had not been noted.

Examination of the abdominal viscera revealed only a distended, firm gall-bladder. This was carefully opened and was found to be filled with multiple, rather firm, greenish-black stones of the bile-pigment type and some quite normal-appearing bile (fig. 1). The stones were smooth but irregular in shape, the largest being 1.7 by 1.2 by 0.7 cm in diameter when dry. The wall of the gall-bladder did not show any marked lesions and was of about average thickness. There were no stones in the cystic or common ducts and no obstruction to interfere with the outflow of bile. The organs in the thorax and pelvis grossly were normal.

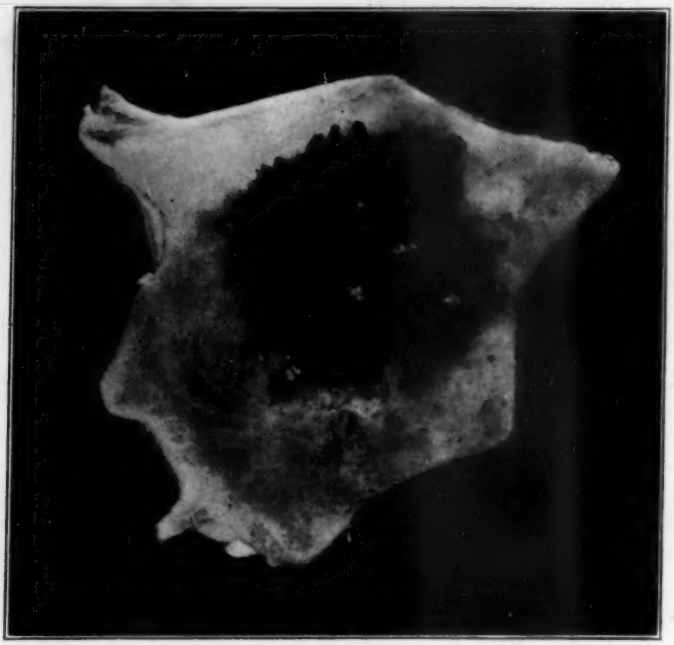


Fig. 2. Distended gall-bladder with gall-stones, showing hypertrophy of mucosa.

Case 2: An aged, male, German shepherd dog, which was in a fair state of nutrition, although he had been failing in health for a month or longer, was destroyed with ether. No definite clinical syndrome had been noted. At necropsy, the following morbid changes were noted: The lungs appeared grossly normal, but definite, small, sand-like concretions could be palpated throughout each lung. The gall-bladder was distended and contained several, small, black-appearing, bile-pigment gall-stones and a rather large area of hypertrophy of the mucosa (fig. 2). This area appeared dark and had an irregular surface to which was clinging some yellowish, sand-like incrustation material. The right kidney was small and appeared atrophied; its pelvis containing a T-shaped stone weighing 1 gm. The left kidney was about twice as large as the right; it apparently had undergone compensatory hypertrophy. All other organs were grossly normal.

Histologic study of the wall of the gall-bladder revealed the thickened portion to be an area of papillary adenomatous hypertrophy. Many acini contained mucus which appeared laminated, as if developing into small nuclei. It is possible that some of the larger gall-stones present had had such an inception.

REFERENCES

[1]Friedberger, F., and Fröhner, E.: Veterinary Pathology. (6th ed., Hurst and Blackett Ltd., London, 1908) i, pp. 280-282.
[2]Law, J.: Veterinary Medicine. (3rd ed., Andrus and Church, Ithaca, N. Y., 1911) ii, pp. 528-537.
[3]Hutyra, F., and Marek, J.: Special Pathology and Therapeutics of the Diseases of Domestic Animals. (Alexander Eger, Chicago, 1926) ii, pp. 428-431.
[4]Totten: Cited by Feldman: Adenocarcinoma of the gall-bladder of a cow. Jour. Cancer Res., xii (1928), pp. 188-194.
[5]Faulkner: Cited by Friedberger and Fröhner.
[6]Birnbaum: Cited by Friedberger and Fröhner.
[7]Averous: Cited by Friedberger and Fröhner.
[8]Trolldenier: Cited by Friedberger and Fröhner.
[9]Dieckerhoff: Cited by Law.
[10]Verheyen: Cited by Law.
[11]Rigot: Cited by Law.
[12]Zundel: Cited by Law.
[13]Mersner: Cited by Friedberger and Fröhner.
[14]Kitt: Cited by Hutyra and Marek.
[15]Sommermeyer: Cited by Friedberger and Fröhner.
[16]Marcus: Cited by Friedberger and Fröhner.

A NEW DILUTION BOTTLE FOR BACTERIA COUNTS*

By HILTON SMITH, *Pullman, Wash.*

College of Veterinary Medicine, State College of Washington

The standard plate count of bacteria in milk necessitates the dilution of a small sample of milk, usually 1 cc, in a certain amount, say 100 cc of sterile water. Most of us have grown to

*Received for publication, February 24, 1936.

tolerate a certain amount of annoyance and difficulty in connection with the autoclaving of this dilution water in the bottles in which it is to be used, because of the tendency of the stoppers to blow out as the steam pressure goes down. Several types of bottles are in use, most of them illustrated in the American Public Health Association's "Standard Methods of Milk Analysis."

The purpose of this report is to describe a bottle, or rather a stopper, which eliminates this disadvantage, as well as others, and which appears not to have been previously used or described elsewhere. Our apparatus is home-made. We use an ordinary rubber stopper of the desired size, put a hole through its center, and insert a glass tube of small caliber which has both ends

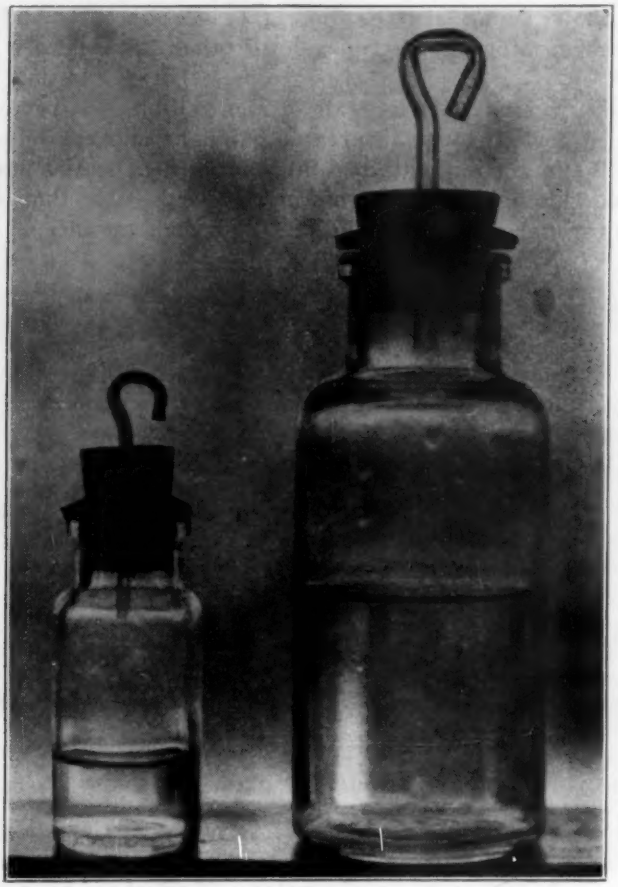


FIG. 1. Two sizes of dilution bottle for bacteria counts.

open, but whose outer end is bent in the form of an inverted U, as shown in figure 1. Around the side of the stopper, at the proper height, we cut a groove some 2 or 3 mm deep and of a width which just admits the wall of a heavy automobile inner tube. This is done by means of a hack-saw in which three fine-toothed blades are fastened side by side to make up the proper thickness. From the inner tube we then cut a hollow circle whose inner circumference is just slightly smaller than the inside of the groove in the stopper. The outer circumference is large enough to form a flange, which covers the top of the bottle when the completed stopper is placed in it. The hollow circle is now stretched and slipped into the groove which encircles the stopper. If the right degree of tension is obtained, this flange can be made to slope downward over the edge of the bottle.

This bottle has two advantages. The inverted-U tube, a principle first employed by Pasteur, permits escape of steam and does away with blowing out of stoppers, yet effectively prevents the entrance of bacteria. We have experimentally found the water in these bottles sterile as long as three months after sterilization, and have used them routinely for two years with similar satisfactory experience. The rubber flange serves to protect the mouth of the bottle from dust and bacteria which might alight on the edge of the glass and fall into the bottle when it was opened. No particular attention is needed in washing; the inside of the glass tube dries without wiping.

SALMONELLA ISOLATED FROM BABY QUAIL*

By ROBERT GRAHAM, *Urbana, Ill.*
Division of Animal Pathology and Hygiene
University of Illinois

In protecting wild life in Illinois, the State Department of Conservation hatches and broods thousands of quail annually. At one of the state game farms which has been operated successfully for many years, a high mortality in baby quail was experienced during the summer of 1935. Many apparently healthy quail, ranging from three days to six weeks of age, died suddenly without showing premonitory symptoms of illness. Baby quail that appeared healthy in the evening were found dead the following morning. In some brooders the mortality was as high as 75 per cent, while it was estimated that 60 per cent of all quail hatched succumbed.

*Received for publication, April 2, 1936.

An inspection of the premises revealed excellent sanitary conditions and approved methods of feeding hygiene. In an effort to determine the cause of the sudden loss of young quail, a bacteriological examination was made of twelve pipped quail eggs immediately preceding hatching, along with 16 freshly laid eggs and five dead baby quail. The fresh eggs as well as the yolks of pipped eggs yielded unidentified streptococci and colon types. The livers of five dead quail were removed and ground in sterile mortar and pestle. Gentian-violet agar plates were streaked with the finely ground liver tissue. An examination of the inoculated plates following incubation at 37° C. for 24 hours showed numerous isolated colonies which, on staining and transferring to differential media, proved to be *Escherichia coli* and Salmonella-like microörganisms.

The Salmonella type isolated from the composite livers gave sugar fermentations resembling *S. newport* in differential media. Acid and gas were produced in dextrose, maltose, arabinose, galactose, levulose, mannitol, rhamnose, sorbitol, trehalose and xylose, while no reaction occurred in lactose, sucrose, inulin, raffinose, salicin or dextrin.

Agglutinating antisera for *S. schottmulleri, S. anatum* and *S. pullorum* in preliminary tests did not agglutinate the quail Salmonella. Agglutinating serum prepared from the quail Salmonella strain agglutinated the homologous antigen in dilutions of 1:1,600 and *S. newport* in dilutions of 1:800. *S. newport* agglutinating serum agglutinated the homologous antigen as well as the quail Salmonella strain in dilutions of 1:600.

The Salmonella type from quail possesses cultural characteristics resembling *S. newport* and, serologically, the quail Salmonella possesses a group relation to *S. newport*. Further observations will be necessary before the identification of the Salmonella isolated from baby quail can be concluded.

AN ACANTHOCEPHALID PARASITIC IN A CALF*

By J. H. WHITLOCK *and* C. C. MORRILL
Department of Pathology, Kansas State College
Manhattan, Kansas

On December 20, 1935, two calves were brought from the vicinity of Riley, Kansas, to the veterinary clinic at Kansas State College, showing typical symptoms of "shipping fever." One of the two calves succumbed the following day and a post-

*Received for publication, April 29, 1936.

mortem examination was made that same afternoon by one of the authors. Lesions confirmed the clinical diagnosis. However, the case presented an unusual feature in that the lower jejunum had a nemathelminth firmly attached to its mucosa (fig. 1). Examination showed the parasite to be an acanthocephalid, probably *Macracanthorhynchus hirudinaceus*, the thorny-headed worm of swine. Its proboscis was embedded in a Peyer's patch; sections of the region examined later showed considerable local necrosis,

FIG. 1. Acanthocephalid attached to intestinal mucosa of calf.

perhaps as a result of secondary infection. Dr. E. W. Price, of the U. S. Bureau of Animal Industry, was kind enough to examine this parasite for us, and although specific identification was impossible, he confirmed our ideas regarding its classification.

Dr. G. Dikmans, of the U. S. Bureau of Animal Industry, has called our attention to the Report of the Puerto Rico Agricultural Experiment Station for 1930 (page 40), which records a successful attempt to infest calves with embryos of thorny-headed worms by feeding them a waterbeetle intermediate host (*Tropisternus collaris*). In their experiment, however, the worm did not develop.

This report, then, as far as we are able to determine, is the first record of a natural infestation of the bovine with a large

acanthocephalid (probably *Macracanthorhynchus hirudinaceus* Pallas, 1781). In addition it is the first report of an infestation in which the parasite had reached a considerable size (15 cm).

We wish to thank Drs. E. W. Price and G. Dikmans, of the U. S. Bureau of Animal Industry, for their invaluable assistance and Dr. H. F. Lienhardt, of the Department of Pathology, Kansas State College, for his time and advice.

MECHANICAL TREATMENT FOR ECLAMPSIA IN THE BITCH*

By E. F. THOMAS, *Ocala, Fla.*

One of our country clients came in recently to pay a bill for a call to see a horse, and while he was in our office he said that he would like to tell us about his boy's dog. The dog, a mongrel fox terrier, which had puppies three weeks old, was noticed one afternoon to be panting unusually hard and seemed to be stiff all over. The client went ahead and described a typical case of eclampsia in the bitch. They gave her a dose of castor oil and spent about three hours with her, giving water in teaspoonful doses all of this time. She seemed to get more rigid and he came to the conclusion that she would die and that it would be better for him to stop her suffering before going to bed. He took his hammer and struck her lightly between the ears. She relaxed as if dead and he went to bed thinking he had killed her. The next morning, to his surprise, she was at the kitchen door looking for something to eat and apparently not injured by the blow on the head and well from whatever ailed her.

Your guess is as good as mine but evidently the relaxation from the blow on the head did the trick. Anesthesia, both ether and nembutal, have done the trick for me several times and I am not changing to this mechanical method of securing relaxation yet and hope I will not have to resort to its use.

New York Meeting at Buffalo

An unusually well-balanced program is being arranged for the annual meeting of the New York State Veterinary Medical Society, to be held at Buffalo, July 16-17, 1936. The clinics will include both large and small animals and will be held in the ballroom of the Hotel Lafayette, which will be headquarters for the meeting.

*Received for publication, May 18, 1936.

INTRACEREBRAL INOCULATION OF FETAL GUINEA PIGS WITH BACILLUS CALMETTE-GUERIN AND THE H37 STRAIN OF TUBERCLE BACILLUS. D. S. Neiman and Oran C. Woolpert. Amer. Jour. Path., xii (1936), 2, p. 153.

Guinea pig fetuses were inoculated with graded doses of *B.C.G.* and the effects obtained compared with those obtained in a similar series inoculated with virulent tubercle bacilli (H37). Both types of tubercle bacilli were found to spread from the sight of inoculation but not with equal rapidity; with the same dose it took longer time for *B.C.G.* to cause as much pathology in the animal as a whole as H37. Pathologically the response of the fetus to both organisms was the same. Histological evidence has been brought forward to show that *B.C.G.* is capable of multiplying in fetal tissues and initiating a disease process different only in degree from that produced by H37. So far attempts at fetus-to-fetus transfer of *B.C.G.* have not been successful. Recovery of this bacillus on artificial media from inoculated fetuses was accomplished four times in 24 attempts.

SPONTANEOUS LEUKEMIA AND CHLOROLEUKEMIA IN THE RAT. S. L. Wilens and E. E. Sproul. Amer. Jour. Path., xii (1936), 2, p. 249.

The spontaneous development of myeloid, chloromyeloid and lymphatic leukemia in a strain of inbred albino rats was studied. The total incidence of leukemia in this strain was 3.3 per cent. The disease is one of advanced life, occurring chiefly in animals over two years of age at death and never in those under the age of 18 months. It is somewhat more common in males than females. No dietary influence on the development of the disease was observed. The pathological changes are described in detail and conform in most respects to those observed in other species, including man. One incidental finding not described in the leukemia of other species is the presence of colloid droplets in the convoluted tubules of the kidneys. The nature of this nephrosis and its relation to rat leukemia is unexplained. Lipoid-contain-

ing phagocytes are almost constantly associated with the extravascular accumulation of myeloid cells. No histological differences between the pigmented and non-pigmented forms of the disease were recognized.

COMPARATIVE OBSERVATIONS ON STREPTOCOCCI FROM HUMAN GASTRO-INTESTINAL ULCERATIONS AND FROM BOVINE MASTITIS. John C. Torrey and Elizabeth Montu. Jour. Inf. Dis., lviii (1936), 1, p. 105.

The Bargen diplo-streptococcus of ulcerative colitis, although exhibiting certain features in common, such as the splitting of raffinose, differed greatly in resistance to heat and in their antigenic constitution as indicated by agglutination and agglutinin absorptions. One strain exhibited all the biochemical attributes of an enterococcus and three others the marked resistance to heat characteristic of the enteric streptococci. Biochemical and serological tests only exceptionally indicated any relationship between the streptococci associated with ulcerative processes in the human gastro-intestinal tract and *Streptococcus mastitidis* of bovine origin. On the other hand, three streptococcal strains from mastitis milk not related culturally or serologically to *S. mastitidis* exhibited such relationships to two enterococcus strains from ulcerative colitis and to certain of the Saunders peptic ulcer and carcinoma strains. These and other findings suggest a bovine origin for certain enterococcus-like organisms capable of invading tissues.

THE PATHOGENESIS OF ACTINOMYCOSIS. Recovery of actinomyces-like organisms from the normal mouth. Frederick T. Lord and Laurence D. Trevett. Jour. Inf. Dis., lviii (1936), p. 115.

The experimental production in animals of lesions histologically identical with actinomycotic tissue and containing typical club-bearing actinomyces granules, by the inoculation of animals with material obtained from the normal mouth suggests the presence in the normal mouth of the actinomyces of the Wolff-Israel type. Naeslund also succeeded in isolating from the normal mouth anaerobic organisms morphologically and culturally like the actinomyces of the Wolff-Israel type and capable of giving rise in animals to characteristic actinomycotic lesions. Organisms of the Wolff-Israel type have not been demonstrated outside the human or animal body and it is unlikely that multiplication takes place in the outside world under ordinary conditions. Implantations of the parasite within the tissue through injury by a for-

eign body may be factors. The buccal cavity is regarded as the portal of entry with secondary invasion of the neighborhood by direct extension and the abdomen and lungs through swallowed or inhaled organisms.

STUDIES ON BACTERIAL NUTRITION. II. The distribution of a growth-stimulating factor in animal and plant tissues. Stewart H. Koser, Felix Saunders, Isadore I. Finkle and Raymond C. Spoelstra. Jour. Inf. Dis., lviii (1936), 1, p. 121.

A growth-stimulating factor which permits development of some of the more fastidious bacteria in a synthetic medium was found to be widely distributed in animal and plant tissues. Of the various sources tested by the method used, calf spleen, calf liver and yeast were the richest although many tissues gave good results. On the basis of the qualitatively similar response of the organisms it appears that there is a marked similarity in the growth factor secured from widely different sources.

PARATHORMONE TOLERANCE IN DOGS. N. B. Taylor, C. B. Weld and J. F. Sykes. Brit. Jour. Exp. Path., xvii (1936), 2, p. 104.

Tolerance to large daily doses of parathormone has been obtained in three dogs. These animals have been shown to survive massive doses of irradiated ergosterol. No evidence has been obtained that this tolerance can be passively transferred to normal animals. Serum from tolerant animals, when injected into normal dogs, failed to lower the serum calcium, to prolong life, to modify hypercalcemia following parathormone injections or to modify the serum-calcium response to continuous intravenous infusion of calcium lactate solution. Hypercalcemia in itself is compatible with life and is not responsible for the toxic effects of irradiated ergosterol.

VARIATIONS OF SALMONELLA PULLORUM. H. Van Roekel and Leo F. Rettger. Jour. Inf. Dis., lviii (1936), 2, p. 172.

Thirteen variants were found in 163 freshly isolated strains of *Salmonella pullorum*. The behavior of these variants in sodium chloride solutions of different concentrations and in the presence of positive and negative serums differed greatly. Other properties such as colonial and cellular morphology, Gram staining and biochemical reactions revealed little or no variation on the whole. *S. pullorum* strains readily underwent variations when subjected to frequent transfer and storage in beef infusion broth.

When variants were cultivated in both meat extract agar and liver infusion agar the colonial and cellular features often appeared markedly different. Some strains which appeared normal on meat extract agar exhibited pleomorphic tendencies when placed on liver infusion agar. Most variants exhibited a lesser degree of virulence than their parent strains and in some instances appeared avirulent. The agglutinogenic power and the absorptive capacity of the variants tested were not equal to those of the normal type.

OBSERVATIONS BEARING ON THE ANTIGENIC COMPOSITION OF PSITTACOSIS VIRUS. S. P. Bedson. Brit. Jour. Exp. Path., xvii (1936), 2, p. 109.

The complement-fixing power of a crude suspension of psittacosis virus depends on elementary bodies and more highly dispersed material which is devoid of virulence removed by Seitz filtration and thrown down to a certain extent by centrifugation at 10,000 r.p.m. Psittacosis virus appears to contain two antigens, one resistant to boiling and another rapidly destroyed at this temperature. Psittacosis antisera contain antibodies to these two antigens, and union between them and their respective antigens *in vitro* can be demonstrated by complement fixation. The clear supernatant fluid which is left when the protein in a crude suspension of psittacosis virus is coagulated by heat contains a heat-stable antigen which gives an allergic skin reaction in the sensitized guinea pig and a weak precipitin reaction with a specific serum but is of no use as an antigen in a complement-fixation test.

THE EFFECTS OF ADRENALECTOMY AND HYPOPHYSECTOMY UPON EXPERIMENTAL DIABETES IN THE CAT. C. N. H. Long and F. D. W. Lukens. Jour. Exp. Med., lxiii (1936), 4, p. 465.

The hypophysectomized cat shows an alleviation of the diabetes following pancreatectomy comparable to that previously demonstrated by others in the dog. It is possible by various procedures to remove both adrenals and all of the pancreas from cats. Such animals have survived for as long as four weeks without the use of insulin, the average survival being 18 days. Daily injections of cortical extract are necessary. By contrast, cats deprived of insulin by similar procedures but with adrenals intact survive only four to five days. Adrenalectomized-depancreatized cats show as striking an alleviation of the diabetes as do

those hypophysectomized and depancreatized. This is expressed by the markedly decreased glucose nitrogen and acetone body excretion compared to that found in the depancreatized cat, as well as by the increased survival period. Removal of epinephrine by denervation or demedullation of the adrenals does not protect against pancreatic diabetes in the cat. The carbohydrate tolerance of depancreatized cats is not significantly increased by hypophysectomy or adrenalectomy. The exceptions to this finding have been in animals presenting varying degrees of spontaneous hypoglycemia. The authors believe the effects of hypophysectomy or adrenalectomy upon pancreatic diabetes are due to a diminution of the production of glucose and acetone bodies rather than to the resumption of normal carbohydrate utilization.

THE ELECTRICAL CHARGE OF MAMMALIAN RED BLOOD CELLS. Harold A. Abramson and Laurence S. Moyer. Jour. Gen. Physiol., xix (1936), 4, p. 601.

From data on the surface area and electrical mobilities of mammalian red blood cells in M/15 phosphate buffer at pH 7.4 it has been possible with the help of the Gouy and von Smoluchowski theories, to calculate the net surface charge per cell as well as the charge per unit area. It was found that a single mammalian red cell has a net surface charge ranging from 4 to 15 million electrons depending on the species. No clear relationship between zoölogical classification and surface charge is apparent. It is suggested that a mechanism exists which is capable of keeping the surface density of net charge constant when comparatively large changes in the surface area occur in the anemias.

STUDIES ON THE ETIOLOGY OF RABBIT-POX. V. Studies on species susceptibility to rabbit-pox virus. Louise Pearce, Paul D. Rosahn and Ch'uan-K'uei Hu. Jour. Exp. Med., lxiii (1936), 4, p. 491.

The white mouse, the guinea pig, the calf and probably the rat were found to be susceptible to infection with the virus of rabbit-pox. Serial transmission of the virus in mice by brain-to-brain passage was characterized by a fatal outcome, usually on the fifth or sixth day after inoculation. Infection of the guinea pig was accomplished by intratesticular injection and the virus was continued to the second passage in this species. Guinea pigs developed a well-marked cutaneous reaction from the intradermal

injection of both rabbit and guinea pig tissue virus. Active virus was demonstrated in the testicles of rats eight days after intratesticular injection by rabbit subinoculation. In the calf inoculation of the scarified skin was followed by the development of large papular lesions with marked hemorrhage and necrosis. The etiology of rabbit-pox and the experimentally induced infection are discussed with special reference to the relation of pox virus to other viruses and of rabbit-pox to other pock diseases.

STUDIES ON AN UNCOMPLICATED CORYZA OF THE DOMESTIC FOWL. V. A coryza of slow onset. John B. Nelson. Jour. Exp. Med., lxiii (1936), 4, p. 509.

A strain of fowl coryza of slow onset was carried through 20 successive passages in susceptible birds over a period of approximately 19 months. During this period it retained its initial characteristics as did also a coryza of rapid onset which was similarly maintained. Eighty-eight per cent of 72 birds infected with the coryza of slow onset showed a nasal discharge after an incubation period of twelve days or more, the actual limits being nine to 31 days. Ninety-eight per cent of 54 birds infected with coryza of rapid onset showed a nasal discharge on the first and second days after infection. The duration of both coryzas was prolonged. Bacteriological examination indicated that *Hemophilus gallinarum*, which is invariably present in the nasal exudate of birds infected with the coryza of rapid onset, is not associated with the coryza of slow onset.

STUDIES ON AN UNCOMPLICATED CORYZA OF THE DOMESTIC FOWL. VI. Coccobacilliform bodies in birds infected with the coryza of slow onset. John B. Nelson. Jour. Exp. Med., lxiii (1936), 4, p. 515.

Minute coccobacilliform bodies have regularly been found in the nasal exudate of fowls infected both by injection and by contact with the coryza of slow onset. These bodies are commonly less than 0.5 microns in diameter and are predominantly extracellular. They have consistently failed to grow on artificial media. They are held back by Berkefeld V filters which are impermeable to *Hemophilus gallinarum* but may pass through filters which are permeable to the test organism. The coccoid bodies are morphologically similar to a cultivable, non-infective bacterium which may occasionally be isolated from exudate of the infected fowl.

THE PHYSIOLOGY OF DOMESTIC ANIMALS. H. H. Dukes, Professor of Veterinary Physiology, New York State Veterinary College at Cornell University. 3rd edition. 643 pages, with 169 illustrations. Comstock Publishing Co., Inc., Ithaca, N. Y., 1935. Price, $6.00.

The first edition of this book appeared in 1933 and was reviewed in the JOURNAL (December, 1933) shortly after its publication. The first edition was lithographed and the general appearance was far from pleasing, particularly the illustrations. A second edition followed, also lithoprinted. The latest edition, however, has been brought out in a very much improved format, printed from type.

The author and his collaborators have taken advantage of the opportunity offered to make numerous alterations in and additions to the text of previous editions. In many places the book has been entirely rewritten and changes have been made in many of the figures illustrating the text.

To say that this book is now "standard equipment" for the student of animal physiology would not be out of place. Likewise, the graduate veterinarian, who desires to "keep up" on his physiology, will find this book a valuable source of information.

CONTROL OF ANIMAL PARASITES. Maurice C. Hall, Ph. D., D. Sc., D. V. M. 162 pages, with 26 illustrations. The North American Veterinarian, Evanston, Ill., 1936. Price, $2.00.

The subject of parasite control is presented by a series of diagrams which present in visual form the factors in the problems of control. The author has employed the use of military terms and tactics in outlining methods of control of animal parasites. There is presented a detailed yet easily understandable outline of the weapons available to combat the parasite enemy. The diagrams present the life histories, so arranged as to show the communication between infested hosts and susceptible hosts and also show the methods that may be used for cutting into these lines of communication.

This text should be a very valuable aid in planning methods of control of animal parasites, as it is the first effort devoted entirely to control measures based on pure science. About one-fourth of the book is given to a comprehensive discussion of tactics and strategy applied to the control of animal parasites. Then follows more specific information regarding the various types of control measures that may be employed against individual parasites, including a historical account of the campaigns that have been used.

In a final chapter on the use of anthelmintics, consideration is given to the various ways in which anthelmintics may be given and the precautions necessary in their administration. This book can be highly recommended for the purpose for which it was written and should be consulted by the physician and veterinarian, as well as by veterinary and medical students.

R. E. R.

Screw Worm on the Increase in the South

New-born animals in the South are suffering most from the screw worm this spring, according to information released by the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. About 75 per cent of all cases of screw-worm infestation in the southern part of the Gulf Coast and South Atlantic States, where this serious insect pest is on the increase, involve the exposed cavities of very young stock.

If breeding operations can be timed to have the young born before the arrival of the fly season, much of the trouble can be prevented. Control early in the season, before the flies are out in very large numbers, according to the entomologists, will greatly simplify the screw-worm problem later in the year.

The only agents that have been found to be of practical value in the control of screw worm are benzol (90 per cent), for killing the worms, and dehydrated pine-tar oil for keeping the flies from laying eggs, as well as for hastening healing. Coal tars, creosote, phenol and other substances that irritate wounds provide more extensive breeding areas for the screw worm. Probing wound cavities, if it results in bleeding, invites further egg-laying.

73rd Annual Convention A. V. M. A.
Columbus, Ohio, August 11-12-13-14

Regular Army

Colonel Robert J. Foster is directed to proceed from Washington, D. C., on or about April 14, 1936, to Lexington, Ky., on temporary duty in connection with veterinary activities at the Remount Purchasing and Breeding Headquarters thence to proceed to Fort Reno, Oklahoma, on temporary duty in connection with veterinary activities at the Remount Depot; upon completion of this duty to return to his proper station.

Veterinary Reserve Corps

NEW ACCEPTANCES

Altaker, Robert Roben.....1st Lt...4611 N. Hutchinson St., Philadelphia, Pa.
Balthaser, Jr., Benjamin F.1st Lt...511 DeKalb St., Bridgeport, Pa.
Gollehon, Charles Wilbur...1st Lt...420 N. Platte Ave., Fremont, Neb.
Ivey, William Edward.....1st Lt...Box 1086, Sacramento, Calif.
Joneschild, Edward Melvin..1st Lt...Live Stock Sanitary Board, Helena, Mont.

PROMOTIONS

To

Abell, Guy Forbes.....1st Lt...Route 2, Rome, Pa.
Apt, Samuel .....1st Lt...117 Montgomery Ave., Bala-Cynwyd, Pa.
Allen, John Kenneth.....1st Lt...Box 195, Ralston, Neb.
Attaway, Ray Seaborn.....1st Lt...Box 117, Princeton, Ky.
Bachtel, David Henry.....1st Lt...Route 2, Canton, Ohio.
Bates, Morgan Willard.....1st Lt...2130 Sullivant Ave., Columbus, Ohio.
Bean, Clyde William.....1st Lt...643 W. Jefferson St., Tallahassee, Fla.
Blackburn, Loren Cleatus...1st Lt...Norman, Neb.
Blake, Gordon Wellington...1st Lt...1217 W. 3rd St., Waterloo, Iowa.
Brinkman, Norman Henry..1st Lt...Colo, Iowa.
Buckley, Bernard Thomas..1st Lt...Fonda, Iowa.
Burkey, Fred Morrison.....Capt...924 S. Haskell, Dallas, Tex.
Case, Ralph Wilson.....1st Lt...1115 E. Van Buren St., Phoenix, Ariz.
Cellar, Paul Markel.....1st Lt...State Dept. of Agriculture, Charleston, W. Va.
Chleboun, Paul Edward.....1st Lt...Crete, Neb.
Collier, James Robert.....1st Lt...Wilkinson, Ind.
Cook, Victor Joseph.....1st Lt...334 P. O. Bldg., Oklahoma City, Okla.
Cottrell, Grant Fuller.....1st Lt...Care H. L. Darby, 503 U. S. Court House Bldg., Fort Worth, Tex.

Crane, Douglas Belden.....1st Lt...65 Grove St., Mount Kisco, N. Y.
Dickson, Howard Strange-
way .....1st Lt...161 Main St., Delhi, N. Y.
Dollahite, James Walton...1st Lt...Wharton, Tex.
Dovre, Odin Esten.....1st Lt...Box 111, Starkville, Miss.
Ebert, Edgar Frazier.....1st Lt...7230 Wornall Rd., Kansas City, Mo.
Ferrall, Walter Candel.....1st Lt...28 Woodland Ave., Columbiana, Ohio.
Firth, Lendall Kiple.....1st Lt...50 E. Buchtel Ave., Akron, Ohio.
Fisk, Loyal Harrel.....1st Lt...Box 175, Fillmore, Utah.
Flory, Oliver Elroy.....1st Lt...East 5207 Commerce, Parkwater, Wash.
Foote, Bernard Eugene.....1st Lt...503 U. S. Court House, Fort Worth, Tex.
Fortune, Richard LeRoy...1st Lt...2 Niagara St., Pulaski, N. Y.
Gifford, Ralph William....1st Lt...20 Mowry Ave., Greenwich, N. Y.
Glass, Harry Manasseh.....1st Lt...731 W. 183rd St., New York, N. Y.
Hasson, David Samuel.....1st Lt...210 E. 5th St., Mulberry, Kan.
Heim, Thomas Brumbaugh..1st Lt...108 W. State St., Alliance, Ohio.
Holmes, John Marshall.....1st Lt...Apt. 705, 9304 Edmunds Ave., Cleveland, Ohio.
Hopson, George Henry.....1st Lt...Millbrook, N. Y.
Joyner, Ashley Josephus.....Capt...6 War Memorial Bldg., Nashville, Tenn.
Kastner, Charles Manuel....1st Lt...830 Fremont St., Manhattan, Kan.
Leasure, Thomas Joy.....1st Lt...809 Vermont St., Lawrence, Kan.
Lenheim, Edward Herman..Major...2011 West St., Topeka, Kan.
Long, Elmer Ira.....1st Lt...219 N. "A" St., Wellington, Kan.
Ludloff, Otto Walter.....1st Lt...1321-B Palolo Ave., Honolulu, T. H.
McCausland, Earl James....1st Lt...Lake Park, Iowa.
McGee Lucius Elijah.....1st Lt...Box 1086, Sacramento, Calif.
Maher, Martin Patrick.....1st Lt...Cromwell, Minn.
Maxey, Howard Curtis.....1st Lt...Riverton, Iowa.
Meyer, Josh Forest.....1st Lt...Gardner, Colo.
Miller, Clement Lambert...1st Lt...Cortland, Neb.
Miller, Malcolm Eugene....1st Lt...N. Y. State Vet. College, Ithaca, N. Y.
Moore, Eugene James.....1st Lt...Box 136, Winston-Salem, N. C.
Morrison, George Alexander.1st Lt...3700 Second Ave., N., Great Falls, Mont.
Morton, John Denman.....1st Lt...711 W. 23rd St., Little Rock, Ark.
Muniz, Charles Manuel.....1st Lt...Box 844, San Juan, P. R.
Murphy, John Joseph.....1st Lt...8 Arthur St., Somerville, Mass.
Pickett, Charles Deets.....1st Lt...225 N. 7th St., Kansas City, Kan.
Peters, James Ralph.....1st Lt...1059 Hazel St., Fremont, Ohio.
Price, Clayton John.....1st Lt...320 Poplar St., Yukon, Okla.
Reid, Ralph Preston.....1st Lt...Washington, Iowa.
St. Clair, Lorenz Edward...1st Lt...Vet. Hospital, Colo. State College, Fort Collins, Colo.
Schladweiler, Alfred Joseph 1st Lt...Box 307, Madison, Minn.
Schoneman, Ben Elmer.....1st Lt...Ellsworth, Minn.
Scott, John Russell.....1st Lt...309 5th Ave., S., South Saint Paul, Minn.
Shoemaker, John Harvey...1st Lt...962 Emerson St., Sheridan, Wyo.
Smith, Esmond Verle.....1st Lt...320 4th St., N. W., Puyallup, Wash.
Smith, Kenneth William....1st Lt...Route 2, West Liberty, Ohio.
Snodgrass, William Birchard.1st Lt...Route 7, Box 194, Salem, Ore.
Spangler, Don Harvey.....1st Lt...1525 F. St., Lincoln, Neb.

Sprowls, Clarence Warden.1st Lt...133 S. Grant St., Wooster, Ohio.
Steibing, Clarence Christian.Capt...1719 Paxton St., Harrisburg, Pa.
Stephan, Carl Frederick....1st Lt...5335 Lake Park Ave., Chicago, Ill.
Stone, Richard Lamport....1st Lt...Trumansburg, N. Y.
Storz, Fred .....1st Lt...4419 Greenwood Ave., Chicago, Ill.
Thompson, Thomas Marion.1st Lt...216 Federal Bldg., Reno, Nev.
Trull, Elliott Rodney.....1st Lt...Bern, Kan.
Van Meveren, Arthur Fredrick .....1st Lt...U. S. B. A. I., Sioux Falls, S. Dak.
Vara, Joseph J.....1st Lt...Bonifay, Fla.
Venzke, Walter George.....1st Lt...Route 1, Galva, Iowa.
Vierling, Clarence Campbell.1st Lt...Route 1, Winterset, Iowa.
Voetberg, Henry Gezines...1st Lt...334 Federal Bldg., Oklahoma City, Okla.
Warnock, Robert Simpson..1st Lt...307 W. 7th St., Aledo, Ill.
Wassenaar, Peter William..1st Lt...515 W. 1st St., Pella, Iowa.
Whitehead, Jack Owen.....1st Lt...Smith Point, Tex.
Wiggins, Thomas Taylor...1st Lt...96 Geneva St., Opelika, Ala.
Wiswell, Wilbur Harold....1st Lt...Gresham, Neb.

NEW ASSIGNMENTS TO ACTIVE DUTY WITH CCC

Allen, John Kenneth.....1st Lt...Fort Snelling, Minn.
Ishee, Vaughn E.....1st Lt...Fort Knox Dist., Fort Knox, Ky.

TERMINATION OF ASSIGNMENT TO ACTIVE DUTY

Hinkle, Truman B.....Major...Fort Knox, Ky.
Meeks, Robert Benjamin...Major...Fort Leavenworth, Kan.
Rogers, Arthur B.....1st Lt...Pocatello, Idaho.

Notice of Examination for Appointments in the Veterinary Corps, Regular Army

The War Department has announced a competitive examination, July 6-11, 1936, inclusive, for the purpose of qualifying doctors of veterinary medicine for appointment as First Lieutenants, Veterinary Corps, to fill existing and anticipated vacancies during the fiscal year 1937.

Applicant must be a male citizen of the United States between the ages of 23 and 32 years, and a graduate of a recognized veterinary college.

Doctor Mohler on the Air

In a radio talk presented on April 28, over the Columbia Broadcasting System, under the auspices of Science Service, Washington, D. C., Dr. John R. Mohler, chief of the U. S. Bureau of Animal Industry, discussed "Farm Animals—Improved Models." He was interviewed by Mr. Watson Davis, director of Science Service, the world's only syndicate devoted entirely to science. Dr. Mohler related some of the things which the Department of Agriculture has done to improve the various types and breeds of farm animals, including poultry.

Report of Gorgas Memorial Laboratory

The eighth annual report of the Gorgas Memorial Laboratory, for the year ended November 1, 1935, contains some interesting material with reference to veterinary activities in Panama. The report was made to Congress, under date of January 2, 1936, on behalf of the Gorgas Memorial Institute of Tropical and Preventive Medicine, Inc., by Dr. Hubert C. Clark, director of the Gorgas Memorial Laboratory; Dr. Bowman C. Crowell, president, and Dr. Cary T. Grayson, chairman of the Board, respectively, of the Gorgas Memorial Institute.

Among other things, the report credits Lt. Col. H. S. Eakins, V. C., U. S. Army, who was stationed in the Canal Zone from October, 1931, until July, 1935, with having conducted a survey and adopted control measures which resulted in the eradication of equine trypanosomiasis from the Canal Zone and neighboring parts of the Republic of Panama. Further investigations have demonstrated that cattle are the most important unharmed carriers of *Trypanosoma hippicum*, the parasite that causes the horse disease known locally as murrina, and that they form the reservoir of this disease. Cattle may carry the parasites for a year or longer. It also has been established that the vampire bat is an important vector of the disease.

Major Raymond Randall, V. C., of the Army Medical Research Board at Ancon, Canal Zone, has developed a complement-fixation test that is of great value in making rapid surveys of infected areas and in the examination of animals that are to be shipped into free areas. The test is used also for detecting carriers on ranges.

The Miraflores Veterinary Station is located in the Canal Zone, on the shore of Miraflores Lake, about five miles from the Panama City laboratory. It is well isolated and can be reached only over the gates of Miraflores Locks or by motor-boat from the shore of Miraflores Lake. Here the studies on trypanosomiasis are being conducted, as well as work on osteomalacia and *Strongylus vulgaris* in horses and mules.

Eradication of Bang's Disease

Figures on the voluntary Bang's disease eradication work for the past 20 months show that during that time 7,399,568 head of cows have been tested, of which 686,450, or 9.3 per cent, have reacted. The highest percentage of reactors were found in Iowa, Kansas and South Dakota, with the number of reactors in the latter state figuring 17.9 per cent.

A comparison between the percentage of tuberculosis reactors and Bang's disease reactors is interesting. In 1918, the first year that any appropriation was made for the eradication of bovine tuberculosis, the percentage of reactors was 4.9, while the percentage reacting during the first stages of the Bang's disease test was 9.3. In other words, about twice as many cows per hundred have been removed on account of Bang's disease.

Continuation of the program is bound to have some effect on production in the dairy industry. "Assuming that 80 per cent of the 686,450 cows reacting were producers, it would mean that 549,000 dairy cows were slaughtered," says N. W. Hepburn, secretary-manager of the Association of Creamery Butter Manufacturers. "Figuring 150 pounds of butterfat per year per cow as a rough average for the country as a whole, it would mean that 82,374,000 pounds of butterfat, or the equivalent of about 103 million pounds of butter, was removed from dairy channels."

—*Chicago Drover's Journal*

Vetalumnus

"Vetalumnus" is the name given to the official organ of the alumni of the College of Veterinary Medicine of the State College of Washington. Two editions have been published, the first in 1935 and the second this year. The editorial staff is composed of members of the Kappa Chapter of Alpha Psi Fraternity, with Ernest W. Cantrall as editor-in-chief of the 1936 edition.

An attempt was made to contact every living veterinary alumnus (or alumna, of whom there are two) of the State College of Washington, for the purpose of finding out what he or she is doing. The effort appears to have met with a fair degree of success, as some information has been published concerning 247 of the 262 living graduates. The exact whereabouts of 19 alumni are unknown, and 21 are known to be deceased.

The data concerning the present whereabouts and activities of the Washington graduates, when analyzed, gives some in-

teresting information. About 40 alumni are in the service of the U. S. Bureau of Animal Industry, most of these being from classes of recent years. There are nine in the U. S. Army, either regular or CCC. Nineteen alumni are engaged in non-veterinary work. Quite a few combine practice and farming. Sixteen are on the meat inspection force of the California Department of Agriculture.

Slightly less than 20 per cent of the living graduates are engaged in practice in the state of Washington. There were 117 graduates in the seven classes from 1929 to 1935, inclusive, and 32 of these are now located in Washington in various lines of veterinary work. This means that other states have absorbed over 72 per cent of the Washington graduates of the past seven years, the largest number (42) going to California. On the other hand, it is interesting to note that the six oldest living graduates (classes 1902 to 1905) are still engaged in practice in various parts of Washington.

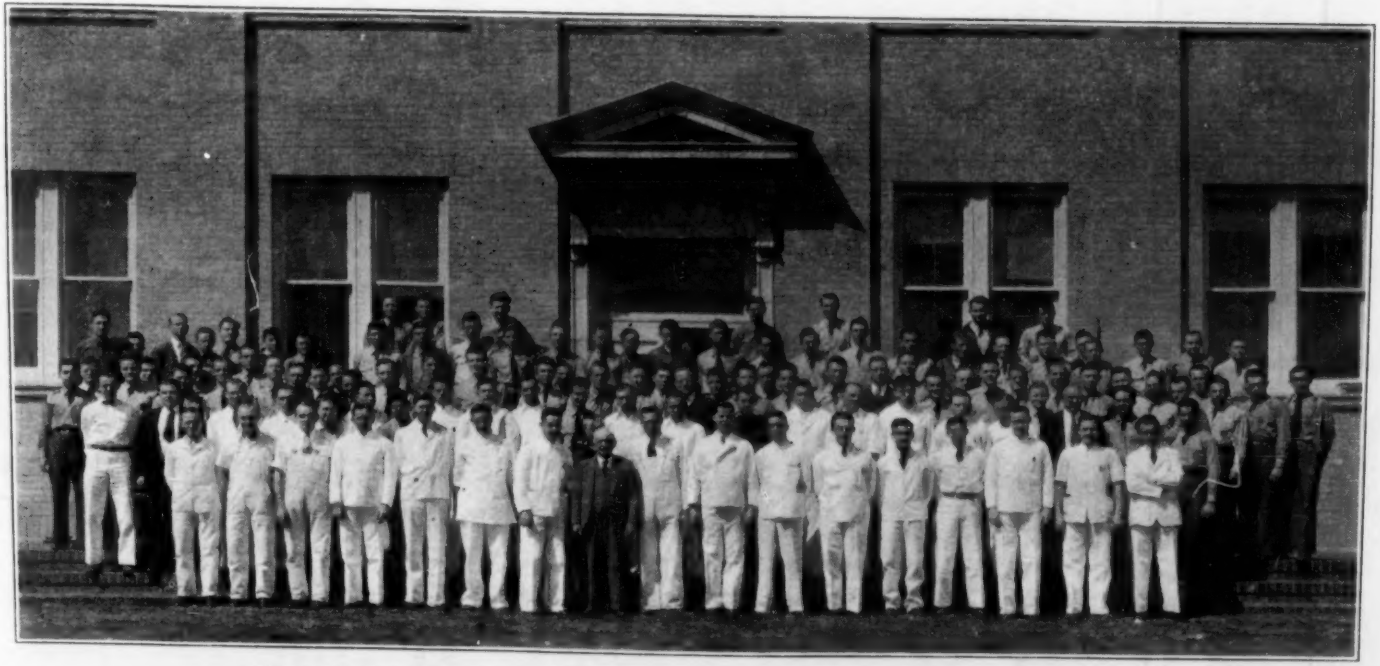
The Alpha Psi men at Pullman have done a very commendable job in collecting and publishing this information. Undoubtedly every Washington graduate will look forward to receiving future editions of "Vetalumnus."

Dean Francis Celebrates 73rd Birthday

Dr. Mark Francis, dean of the School of Veterinary Medicine at the A. and M. College of Texas, recently was honor guest at a birthday banquet, given by the Student Chapter of the American Veterinary Medical Association, to celebrate his 73rd birthday. Other guests included Charles Puryear, dean emeritus of the College; Dr. Archie Stallings, of Houston; Dr. Henry Harrison, of Bryan; and members of the veterinary and college faculties.

A huge cake bearing 73 lighted candles adorned the speakers' table. Music by the Aggieland Orchestra and short speeches by guests were the chief features of the program. Charles Coleman, of Alpine, was toastmaster.

There are 160 students enrolled this year in the School of Veterinary Medicine at College Station, the largest enrollment in its history. About 125 of these are members of the Student Chapter of the A. V. M. A. Officers of the Chapter are: R. L. Sudheimer, President; J. F. Melton, Vice-President, and R. H. Hartman, Secretary-Treasurer.



STUDENTS OF THE SCHOOL OF VETERINARY MEDICINE, A. & M. COLLEGE OF TEXAS, 1935-36.

COMMENCEMENTS

ONTARIO VETERINARY COLLEGE

Forty-five candidates received the degree of Bachelor of Veterinary Science at the Convocation of the University of Toronto, May 8, 1936. They are:

V. K. AlagaRaju
J. G. Anderson
L. G. Anderson
G. N. Blum
L. E. Bodenweiser
W. C. Bovaird
H. W. Brooks
H. W. Cain
C. B. Dearborn, Jr.
R. L. Digman
L. E. Estler
D. E. Faulkner
J. G. Gagnon
A. L. Geffert
E. W. Gray
J. G. Hamilton
J. A. Henderson
K. G. Jackson
N. N. Jerome
J. E. Leeson
R. A. Lombard
I. W. Moynihan
J. McKay, Jr.
H. R. McLean
K. B. Nair
J. A. Nelson
R. E. Pinkert
J. W. Pullin
W. C. Ready
W. M. Rice
A. Richardson
F. Rushton
M. H. Ryan
R. E. Sargent
T. H. Spence
J. A. B. Stewart
G. M. Stewart
S. N. Thompson
F. W. Timm
J. L. Topham
W. A. Walker
S. N. Ward
J. D. Winn
H. Worton
R. A. Young

Prizes were awarded to members of the graduating class as follows:

Honor Standing

Gold Medal for highest aggregate standing—J. E. Leeson, of Guelph, Ont.
Second Prize—R. E. Pinkert, of Grafton, Wis.
Third Prize—R. A. Young, of Bolton, Ont.

Andrew Smith Memorial Medal

J. W. Pullin, of Woodstock, Ont.

Helen Duncan McGilvray Prize

D. E. Faulkner, of London, England

Bacteriology, Special Prize

J. A. Nelson, of Vancouver, B. C.

Canadian Army Veterinary Corps Prize

J. G. Gagnon, Dorchester, Que.

Science Association Prizes

R. L. Digman, of Milwaukee, Wis.
I. W. Moynihan, of Toronto, Ont.

ALABAMA POLYTECHNIC INSTITUTE

The sixty-fourth annual commencement exercises of the Alabama Polytechnic Institute were held at Auburn, May 25, 1936. The address at the Baccalaureate Exercises was delivered by Guy Everett Snavely, A. B., Ph. D., LL. B., Litt. D., president of Birmingham-Southern College. In the School of Veterinary Medicine, 21 candidates received the degree, Doctor of Veterinary Medicine:

Thomas Copeland Berry
Dwain Taft Bowie
Andrew Franklin Clark
Charles Edward Cox
Sylvan Dekalb Culver
Dwight James Dark
Charles Ferguson Davis
Benjamin Walker Dean
Albert Vernon Dixon
Eldred Walton Exley
Leo Landers
Edgar Belton McKinney
Bernard Maloney
Charles Dudley Price, Jr.
Howard Bowen Smith
Hugh Dowd Smith
Luis Alberto Sordo-Gonzalez
Coleman William Tant
Joseph Lewis Wesley
Carlos Stanford Wilbanks
Thomas Glenn Wright

KANSAS STATE COLLEGE

The seventy-third annual commencement exercises of Kansas State College were held at Manhattan beginning May 23 and terminating May 25, 1936. In the Division of Veterinary Medicine, 21 candidates received the degree, Doctor of Veterinary Medicine. They are:

Charles Deferese Chase
*Robert William Cook
*Russell Parker Cope
*Loris Arthur Dehner
*Mark Ernest Gale
*Robert Elmer Gouge
*Thomas Clark Hinkle, Jr.
*Obed Keith Lassen
Sydney Paul Levene
*Henry James Lindenstruth
Edward Nash McGrew
*Edgar William Millenbruck
*Edward Aloysius Murphy
Obed Edmund Myrah
Paul Talogi Nomura
Gopel Singh Rathore
*Arnold Samuel Rosenwald
Horton Earl Ryan
*Arthur Louis Tellejohn
*Marvin John Twiehaus
*John Leslie West

Fourteen members of the graduating class (indicated by *) received commissions in the Veterinary Officers Reserve Corps of the United States Army.

High honors were awarded to Arnold Samuel Rosenwald. Honorary recognition was also given to John Leslie West.

K. S. C. Recognition Day

The thirteenth annual Recognition Day program of the Kansas State College took place in the College Auditorium, Manhattan, April 30, 1936. The names of the prize-winners in the Division of Veterinary Medicine are as follows:

General Proficiency

Prizes offered by Drs. Benj. F. Pfister (K. S. C. '21) and Earl F. Hoover (K. S. C. '24), both of Kansas City, Mo.
First Prize ($15) ..... Edgar William Millenbruck, '36
Second Prize ($10) ..... Marvin John Twiehaus, '36

Therapeutics

Prizes offered by Dr. C. E. Salsbery (K. C. V. C. '11), of Kansas City, Mo.
First Prize ($10) ..... Edwin Morris Crawford, '37
Second Prize ($5) ..... Guy William Bayles, '37

Pathology

Prizes offered by Dr. O. M. Franklin (K. C. V. C. '12), of Amarillo, Tex.
First Prize ($10) ..... Arnold Samuel Rosenwald, '36
Second Prize ($5) ..... Loris Arthur Dehner, '36

Physiology

Prizes offered by Dr. N. D. Harwood (K. S. C. '18), of Manhattan, Kan.
First Prize ($10) ..... Jack Edward Baker, '38
*Second Prize ($2.50) ..... J. J. Sarasohn, '38
*Second Prize ($2.50) ..... Joseph Sterling, '38

Small-Animal Clinic

Prizes offered by Dr. C. W. Bower (K. S. C. '18), of Topeka, Kan.
First Prize ($10) ..... Henry James Lindenstruth, '36
Second Prize ($5) ..... Horton Earl Ryan, '36

Cornell University Honor Day

Honor Day exercises of the New York State Veterinary College at Cornell University, Ithaca, were held May 8, 1936, with Dean W. A. Hagan presiding. Dr. F. D. Holford (Corn. '02), Chief Veterinarian, Borden Farm Products Company, New York, delivered the opening address and President Livingston Farrand awarded the prizes as follows:

Addison D. Merry Prize

Given by Dr. A. E. Merry (Corn. '06), Syracuse, N. Y., for the best work in veterinary anatomy.
First Prize ($30) ..... Benedict V. Favata, '38
Second Prize ($20) ..... Stephen J. Roberts, '38
Honorable Mention: Alexander Morris, '38; Robert B. Morris, '38, and John W. Earl, '38.

Jane Miller Prize

Given by Dr. Frank H. Miller (Mont. V. C. '87), New York, for the best work in veterinary physiology.
First Prize ($30) ..... Dorsey W. Bruner, '37
Second Prize ($20) ..... Arnold Eder, '37
Honorable Mention: Herbert Racoff, '37; Carl Kellman, '37, and Irwin H. Roberts, '37.

Charles Gross Bondy Prize

Given by Mr. Richard Bondy, New York, for the best work in the courses in practical medicine and surgery of the small animals.
First Prize ($25) ..... George E. Burch, '36
Second Prize ($15) ..... Walter J. Williams, '36
Honorable Mention: Martin H. Fremont, '36; Julia G. F. Kinsey, '36, and Francois Levesque, '36.

Anne Besse Prize

Given by Miss A. B. Jennings, New York, for the best work in medicine and clinical diagnosis.

First Prize ($30) ..... John C. Sweatman, '36
Second Prize ($20) ..... Francois Levesque, '36
Honorable Mention: Martin H. Fremont, '36, and Joseph G. Dufresne, '36.

James Gordon Bennett Prize

Given by James Gordon Bennett, New York, for the students who show the greatest humaneness in handling animals, with special reference to the use of anesthesia.

First Prize ($30) ..... Francois Levesque, '36
Second Prize (20) ..... Frederic B. Thomson, '36
Honorable Mention: Walter J. Williams, '36; Joseph G. Dufresne, '36, and Martin H. Fremont, '36.

Horace K. White Prize

Given by Horace K. White, and his sons, of Syracuse, for the students whose academic records for the entire veterinary course stand highest.

First Prize ($100) ..... Henry Kriesel, '36
Second Prize ($25) ..... John C. Sweatman, '36
Honorable Mention: Francois Levesque, '36; George E. Burch, '36, and Martin H. Fremont, '36.

The Prize of the Organizing Committee of the Twelfth International Veterinary Congress

A set of the proceedings of the Congress awarded to the graduating student whose scholastic record stands highest.

Henry Kriesel, '36

Honor Graduates Receive Proceedings

The highest ranking student in the 1936 graduating class in each of the twelve veterinary colleges in the United States and Canada will receive a complimentary copy of the Proceedings of the Twelfth International Veterinary Congress, as the result of an action by the Finance Committee of the Congress, according to an announcement sent by Dr. J. R. Mohler to all veterinary deans.

Plan Your Trip to the Convention . . . . Now!

To any member of the A. V. M. A. who is thinking of motoring to the convention in August, the Conoco Travel Bureau, of Denver, Colorado, offers free travel service. They will send you, on request, a set of state maps individually marked for you, to show the best and most direct routes from your home to Columbus, Ohio. The types of roads and road conditions will be indicated, and lists of hotels and cottage camps included.

In addition you will receive beautifully illustrated literature descriptive of places of interest along the way. Are you interested in America's history, in scenery, in fishing, in golf, in hunting, in big cities, or would you like to know the shortest way to the convention? Write the Conoco Travel Bureau, Denver, Colo.

LOUISIANA VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Louisiana Veterinary Medical Association was held in connection with the Fifth Annual Veterinary Short Course, at Louisiana State University, Baton Rouge, February 26-27, 1936. From every angle, this meeting was the largest and best in the history of the Association.

Dr. W. T. Oglesby, of Louisiana State University, was chairman of the Program Committee and he really did himself proud in securing for the program: Dr. J. C. Flynn, president of the A. V. M. A.; Dr. C. R. Donham, of Ohio State University; Dr. T. A. Sigler, of Greencastle, Ind., and Dr. Frank E. Kitchen, of Greenville, S. C. Dr. J. F. DeVine, of Goshen, N. Y., was also a notable visitor. There were 49 veterinarians at the meeting, of whom 25 were members of the A V. M. A.

Dr. Donham gave a talk on Bang's disease that was most instructive and interesting. He brought out many new points relative to this important subject. Dr. Flynn gave interesting talks on skin diseases of dogs and cats, diseases of the eye of small animals, as well as a number of clinical demonstrations, all of which were very instructive.

Dr. Sigler handled the large-animal clinics in his usual grand manner and also gave a talk on digestive disturbances in horses and mules. Dr. Kitchen, who is connected with the Department of Health of his city, gave a very fine talk on the production of milk from the standpoint of the veterinary practitioner.

On the evening of the 26th, the banquet was held in the Louisian Hotel. Dr. W. A. McDonald officiated as toastmaster. There were 78 at this function. After the visitors and other speakers had been called upon for brief talks, Dr. Flynn showed a motion picture, "Rabies," that every practitioner should see.

Officers for the coming year were elected as follows: President, Dr. Hamlet Moore, New Orleans; vice-president, Dr. G. A. Bryson, Shreveport, and secretary-treasurer, Dr. C. M. Heflin, Baton Rouge.

C. M. HEFLIN, *Secretary-Treasurer.*

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

On Wednesday evening, April 1, 1936, the Veterinary Medical Association of New York City held the monthly meeting at the Hotel New Yorker, New York City. The speaker was Dr. Lester R. Barto, associated with Dr. J. B. Engle, of Summit, N. J. The topic of the speaker's paper was "Some Improvements We Could Adopt to Advantage." The basis for Dr. Barto's talk was founded on his actual observations and findings while traveling and studying in Europe, which afforded him opportunity to visit such countries as England, France, Germany, Austria, Sweden, Italy and Belgium.

At the Veterinary School in Vienna, Dr. Barto found that a well-equipped x-ray clinic was doing splendid work. This x-ray institute has its own clinics and the patients are supplied from two sources, the practitioners and the college itself. The subject to be x-rayed is always fluoroscoped first, regardless of history. We were informed that, after one becomes accustomed to applying the fluoroscopic examination, it is possible to limit the x-ray field to the desired point in question and also to pick out and diagnose various conditions.

In preparing for an x-ray examination the animal is fed a mixture of barium meal (6 parts), corn starch (1 part), and sugar to sweeten, mixed with water to make it easy to administer. Dr. Barto said that most animals will take this mixture of their own accord. Naming some of the maladies which he saw treated with x-ray and elaborating on the results, he told us that in the x-ray therapy clinic such conditions as furunculosis, acne, glandular diseases, chronic eczema, sarcomata, productive ulcerative cystitis, alveolar bone necrosis, depigmented nose, ceruminous otitis, chronic ulcerative otitis, and auricular papillomata (after surgical removal of the papilloma) receive various x-ray exposures and the results are gratifying.

In the treatment of deep-seated conditions copper filters are used which send 80 per cent of the rays to a deep penetration, while if a superficial treatment is required, a zinc filter is used and then 80 per cent of the rays are superficial. Treatments are given at 4- to 6-day intervals and it usually requires three weeks for a treatment to reach its height and the time of exposures will vary from 5 to 25 minutes.

Turning to the subject of anesthesia, Dr. Barto said that in London 80 per cent of the surgical work is performed under the influence of nembutal. In connection with this anesthesia in

London, it was noted that a tube of carbon dioxide was on hand and if a respiratory failure occurred, the carbon dioxide would be administered, the patient would make an uneventful recovery and the operation would be continued. The carbon dioxide does not replace strychnine, for either one may be used alone or they may be used together.

In reference to nembutal anesthesia, Dr. Barto said that in his experience 1/5 grain per pound of body weight was not sufficient for good anesthesia in the cat, but found that ¼ grain per pound of body weight was a more satisfactory dose and that 1/3 grain produced a very deep anesthesia, requiring about 72 hours for complete recovery. In Hannover, Germany, ether anesthesia was administered intratracheally. In Leipzig, horse anesthesia was administered by the intratracheal route, ether being used. In Vienna, ether and local anesthetics are used and in Stockholm all surgery is done under local anesthesia. All cesarean sections are performed under local. While in Vienna, Benesch used local in cesarean sections, only when the bitch was exhausted and highly toxic.

Dr. Barto told us that, in London, Dr. Wright will positively diagnose pregnancy on palpation as early as 18 days. Dr. Wright has developed this technic and claims that by practice it can be perfected. X-ray diagnosis of pregnancy is uncertain. To use this method the bitch should be fed a barium meal and then have a picture taken. The colon will be displaced and in the middle, if there is a distention of the uterus.

As a most unusual climax to a very interesting and instructive lecture, we were privileged to view several reels of film showing views of Italy, France, and the new veterinary school at Leipzig, Germany. We were made to feel that we were actually with Dr. Barto on his year of travel and study in Europe.

R. S. MacKellar, Jr., *Secretary-Treasurer.*

NORTH CENTRAL IOWA VETERINARY MEDICAL ASSOCIATION

The North Central Iowa Veterinary Medical Association held a very successful meeting at the Hotel Warden, Fort Dodge, May 6, 1936. A very interesting and informative technical program was presented.

Dr. G. E. Van Tuyl, of Paulina, discussed "Equine Practice." Major C. F. Cox, V. C., U. S. Army, of Fort Des Moines, told

about the Remount Service of the Army. Dr. C. N. McBryde, U. S. Bureau of Animal Industry, Ames, reviewed the experimental work of the Bureau in connection with hog cholera. In the course of his remarks, Dr. McBryde touched upon the new crystal violet vaccine developed by the late Dr. Marion Dorset. The speaker paid a glowing tribute to Dr. Dorset, having been closely associated with him in various research projects for thirty years.

Dr. S. W. Simmons, of Ames, discussed "Recent Contributions of Entomologists to Veterinary Science." Dr. P. V. Neuzil, of Blairstown, gave his colleagues some suggestions for building a poultry practice. Dr. L. F. Bacon, of Cedar Falls, presented "Canine and Feline Practice."

Other speakers who addressed the meeting included: Dr. Robert D. Wall, Des Moines, president of the Iowa Veterinary Medical Association; Dr. H. A. Seidell, Des Moines, State Veterinarian, and Dr. J. A. Barger, Des Moines, Inspector-in-Charge, U. S. Bureau of Animal Industry.

Dr. George Evans, of Clarion, presided at the business session in the morning and delivered the presidential address to open the afternoon session. The election of officers resulted as follows: President, Dr. J. O. F. Price, Algona; vice-president, Dr. P. O. Dorweiler, West Bend, and secretary-treasurer, Dr. H. C. Smith, Fort Dodge.

The visiting ladies were entertained with a luncheon followed by a bridge party. The hostesses were the wives of the B. A. I. veterinarians stationed at Fort Dodge. In the evening everybody attended a banquet and dance in the ballroom of the Hotel Warden. An elaborate program of entertainment, consisting of specialty dance numbers, piano and vocal solos, was made possible through the courtesy of ten commercial firms.

EAST CENTRAL (IOWA) VETERINARY ASSOCIATION

The May meeting of the East Central Veterinary Association was held at the Hotel Montrose, Cedar Rapids, Iowa, on the 14th. Veterinarians and their wives to the number of 42 were in attendance from twelve East Central Iowa counties.

The address of welcome was given by Dr. R. M. Hofferd, of Cedar Rapids, and the response was made by Mrs. H. N. Strader, of Marion.

Judge H. C. Ring, of the Superior Court of Iowa, Cedar Rapids, presented a discourse on "The Veterinarian and the Law."

Judge Ring reviewed the Cow War case, which was tried before him several years ago, and touched on such subjects as the revocation of veterinary licenses, legal responsibilities of veterinarians, the constitutionality of the Iowa Bovine Tuberculosis Eradication Act, police powers of state veterinary regulatory officers, and malpractice.

Dr. C. N. McBryde, of Ames, reviewed the history of hog cholera in the United States, the discovery of the filtrable virus, and the development of the method for the hyperimmunization of hogs to produce anti-hog cholera serum. He stated that approximately 300,000,000 swine had been immunized during the past 20 years. In speaking of the new crystal violet vaccine, Dr. McBryde said that much experimental work remains to be done to determine the value and limitations of the new product. Tests of the vaccine under field conditions are now being made under the supervision of the Bureau of Animal Industry. Dr. McBryde illustrated his talk with lantern-slides showing scenes of the early days at the Ames laboratory and the crude methods employed in the production of the first anti-hog cholera serum in 1908. He closed with a fine eulogy of Dr. Marion Dorset, his chief and friend for 31 years.

Others who contributed to the program included: Dr. J. A. Barger, Des Moines; Dr. P. V. Neuzil, Blairstown; Dr. H. S. Perdue, Cedar Rapids, and Dr. G. C. Faun, Cedar Rapids.

Chicago Requires Poultry Inspection

According to an ordinance adopted recently by the City Council of Chicago, the packing or selling of canned poultry and canned poultry products within the city of Chicago is illegal unless these shall have been inspected and passed as fit for consumption as human food by the U. S. Department of Agriculture.

The ordinance also provides for the marking of each container, to show that its contents have been inspected and passed, as well as the name and address of the packer or distributor. Violation of the provisions of the ordinance will render the packer or seller subject to a fine of not less than $25 and not more than $200 for each offense.

Inspection of dressed poultry is at present conducted by the Bureau of Agricultural Economics and the service is available to all poultry canners who are willing to pay the costs and to make suitable arrangements for veterinary inspection. Dr. Colonel Edmunds is supervisor of this work in the Chicago territory.

NECROLOGY

THOMAS EMMETT SMITH

Dr. Thomas E. Smith, of Jersey City, N. J., died at his home, on April 5, 1936. Death was caused by a heart condition, after an illness of two weeks.

Born in Jersey City, on December 20, 1866, Dr. Smith had lived all his life within a four-block radius of his birthplace at 30 Bright Street, but was widely known and loved in his native city, state, and nation as well as abroad. He received his early education at Saint Aloysius' Academy and Saint Peter's College, Jersey City, and was graduated from the New York College of Veterinary Surgeons in 1897. Beginning in 1883, as a boy of 17, he helped to carry on very successfully for many years a large livery stable business established by his father and did not begin his veterinary education until 1894.

A year after his graduation in 1897, Dr. Smith was appointed as veterinarian to the Jersey City Police Department. On January 1, 1900, he was appointed veterinarian to the Jersey City Fire Department and he continued to serve as City Veterinarian until his death. In April, 1902, he was made a member of the newly created New Jersey State Board of Veterinary Medical Examiners and served in this capacity over a period of years during a number of different administrations.

In 1912, and again in 1913, he was elected president of the Veterinary Medical Association of New Jersey and for many years continued to serve his state society capably and tirelessly as a member of the Executive and other committees. His regular attendance at association meetings and his active participation were outstanding. Dr. Smith also took part in legislative matters affecting the practice of veterinary medicine and the setting up of an efficient State Bureau of Animal Industry, under the direction of a veterinarian, as effected in New Jersey in 1916. He was a member of the New Jersey Health and Sanitary Association, the Veterinary Medical Association of New York City, the Hudson County Road Drivers' Association, the Jersey City Lodge of Elks, Knights of Columbus, Order of Alhambra, and a

former member of the Carteret Club. Dr. Smith was also a member of the old Union League Club of Jersey City during its existence.

DR. T. E. SMITH

Dr. Smith joined the A. V. M. A. in 1898 and served as resident secretary for New Jersey, 1901-03 and 1916-19; as chairman of the Committee on Finance, 1903-05; as member of the Committee on Publications, 1905-06 and 1907-08; and as member of the Special Committee on Fiftieth Anniversary, 1912-13. At the meeting in Philadelphia in 1918, he was elected Fourth Vice-President.

An editorial in the *Jersey Journal* paid Dr. Smith the following tribute:

In the death of Dr. Thomas Emmett Smith, the animals of the city, and the animal-lovers, have lost a tried and true friend.

Dr. Smith, who was city veterinarian ever since he first started practice 36 years ago, founded a free clinic for animals, where many suffering pets which might otherwise have succumbed to early death were brought by their sorrowful owners. Boys and girls with arms full of ailing fuzz repaired to Dr. Smith, who usually knew just the thing to do to bring back the brightness of eye and the friskiness of spirit to the cats and dogs.

Probably it was his childhood experience which first gave Dr. Smith the urge to spend his life caring for sick animals, for his father, the late Byran Smith, conducted a livery stable at Barrow Street and Warren for many years. There the youthful animal-lover watched his father's horses and came to know and love them.

History, they say, repeats itself. It would be a happy day for Hudson County dog-lovers if the history made by Dr. Smith's self-sacrifice and service for the dumb animals of this county could find repetition some day.

Dr. Smith is survived by his widow (née Joanna Regan), three brothers and a sister. J. G. H.

THOMAS H. HICKS

Dr. Thomas H. Hicks, of Milbank, S. Dak., died December 14, 1935, while testing cattle in Roberts County. He had gone to the garage and sat down in the office while an attendant was getting his car out. He died while seated in the office.

Following his graduation from the Chicago Veterinary College in 1894, Dr. Hicks located at Milbank and built up an extensive practice. He was state veterinarian of South Dakota from March 1, 1907, until March 1, 1913. When he left public office, he returned to Milbank, but did not practice very much. He became interested in farming, was an extensive land-owner, and served as county commissioner of Grant County for several terms.

Dr. Hicks joined the A. V. M. A. in 1909.

J. P. F.

JOHN A. McCRANK

Dr. John A. McCrank, of Plattsburg, N. Y., died March 16, 1936, after a brief illness. He was actively engaged in practice almost to the end, as had been his wish.

Born at Plantagenet, Ontario, in 1863, Dr. McCrank was graduated from McGill University, with the class of 1891. He located in Plattsburg that year and always took an active part in all matters pertaining to the good of his adopted city. He served both as alderman and City Supervisor. When the Board of Health was established in Plattsburg, he was given charge of the Milk Department and continued to hold this position until

death relieved him of his labors. Dr. McCrank was the first graduate veterinarian to locate in Plattsburg, and the high standing of the veterinary profession in Clinton County has its foundation based on his faithful practicing of all its principles.

Dr. McCrank joined the A. V. M. A. in 1900. He had been a member of the New York State Veterinary Medical Society since 1896 and was also a member of the Twelfth International Veterinary Congress. He was a member of the Knights of Columbus and the Maccabees and had occupied all of the principal chairs in these organizations.

C. J. M.

RICHARD HARRISON

Dr. Richard Harrison, of Bad Axe, Mich., died at his home, April 14, 1936. He had celebrated his 87th birthday on February 27, and he and Mrs. Harrison had celebrated their 60th wedding anniversary on March 5 of this year.

A native of Canada, Dr. Harrison located in Bingham Township, Huron County, Mich., in 1887. He was graduated from the Ontario Veterinary College in 1891 and pioneered in the introduction of purebred cattle into Huron County. He was township supervisor, justice of the peace and school moderator, in addition to conducting a general practice until 1928, when he retired.

Dr. Harrison is survived by his widow, four sons and two daughters.

GEORGE R. YOUNG

Dr. George R. Young, of Omaha, Nebr., died at his home, April 3, 1936, at the age of 75 years. Heart trouble was the cause of death.

Following his graduation from the Chicago Veterinary College, in 1887, Dr. Young located in Omaha and practiced there for 49 years. He was a charter member of the Nebraska Veterinary Medical Association and of the Ak-Sar-Ben Veterinary Medical Association.

Dr. Young was a member of the A. V. M. A. from 1898 until 1924. He was a Scottish Rite Mason and a Past Master of Capitol Lodge No. 3, A. F. & A. M. He is survived by his widow, two sons and two daughters.

A fine gentleman, an able practitioner and a credit to his profession, his loss will be felt.

C. C. H.

ALEXANDER TYLER

Dr. Alexander Tyler, of Elgin, Ill., died at Saint Joseph's Hospital, Elgin, November 29, 1935. He was born October 11, 1852, and had been a resident of Elgin practically all the time since his graduation from the Chicago Veterinary College, in 1889. He retired from active practice a few years ago.

EMMETT T. DAVIS

Dr. Emmett T. Davis, of Indianapolis, Ind., died at his office, of a heart attack, on March 23, 1936, at the age of 67 years.

Born in Plainfield, Ind., Dr. Davis attended public schools there and later was a student at Purdue University. He then entered the Indiana Veterinary College and was graduated in 1910. He returned to Plainfield and engaged in practice there. In 1921, he located in Indianapolis, and since 1923 operated the Davis Veterinary Hospital with his son, Dr. Roger Davis.

While a student at Purdue, Dr. Davis was a roommate of former Governor Samuel M. Ralston. The latter appointed Dr. Davis a member of the Indiana State Board of Veterinary Medical Examiners. He is survived by his widow and two sons.

HARRY R. CLEVELAND

Dr. Harry R. Cleveland, of Danville, Quebec, Canada, died at his home, April 17, 1936.

Born at Danville, Quebec, August 16, 1873, Dr. Cleveland obtained his preliminary education at Danville Academy, and at high schools in South Natick, Mass., and Burlington, Vt. He later attended McGill University from which he was graduated with the degree of D. V. S. in 1894. He was president of his graduating class.

Dr. Cleveland first practiced at the Malden Veterinary Hospital, Malden, Mass., under the guidance of Dr. W. M. Simpson (Mont. '89—McGill '90). He then returned to Danville, where he continued to practice until 1912. While in practice, he also managed the stock farm known as Rock Farm for several years and later became its owner. This farm specialized in the breeding of Standard-bred horses, and imported from the United States some of the best blood to be found in the American trotter. In 1912, Dr. Cleveland became associated with the firm of J. L. Goodhue and Co., Ltd., manufacturers of leather belting and lace leather, and served as president of the firm until 1915.

At the outbreak of the World War, Dr. Cleveland held a commission as Captain in the Reserve Officers of the Canadian Army Veterinary Corps. At this time, he volunteered for service and was placed on the active list in December, 1914, and attached to the 6th Brigade, C. F. A. Upon the organization of the 5th C. M. R., a unit mobilized in the vicinity of Dr. Cleveland's home early in 1915, he was transferred to this unit with which he proceeded to France. Later, when the 5th C. M. R. became part of the 8th Infantry Brigade, Dr. Cleveland became Brigade Veterinary Officer, which post he held until he was seriously wounded in 1917, and sent home from France. Upon returning to Canada, he resumed his connection with J. L. Goodhue and Co., Ltd., as vice-president, which connection he retained until the time of his death.

Dr. Cleveland joined the A. V. M. A. in 1923. He was a school commissioner from 1902 to 1905, and a member of the City Council from 1906 to 1915. During this period, he served one term (1910-11) as mayor. He was a Mason and had served as a Past Master of his lodge and as a P. G. S. W. of the Grand Lodge of Quebec. He is survived by one son.

W. M. S.

LOUIS J. KUTZENBERGER

Dr. Louis J. Kutzenberger died at his home in Harlingen, Texas, April 18, 1936, after an illness of several weeks, due to pneumonia. He was a graduate of the Chicago Veterinary College, class of 1905, and practiced at Jerseyville, Ill., until about 15 years ago, when he sold his practice and moved to Texas, where he purchased a farm. He is survived by his widow (née Clara Massey) and three sons.

PATRICK CAIN

Dr. Patrick Cain, of Estherville, Iowa, died at his home, April 19, 1936, after a long illness. He was a graduate of the Ontario Veterinary College, class of 1896, and practiced at Estherville for 35 years. Two years ago, he retired and disposed of his practice to Dr. L. F. Hoffman. Dr. Cain is survived by his widow and one son.

LOUIS HERBERT HOUGH

Dr. Louis H. Hough, of Kouts, Ind., died at his home, April 24, 1936, following an illness of a year. Heart trouble was the cause of death.

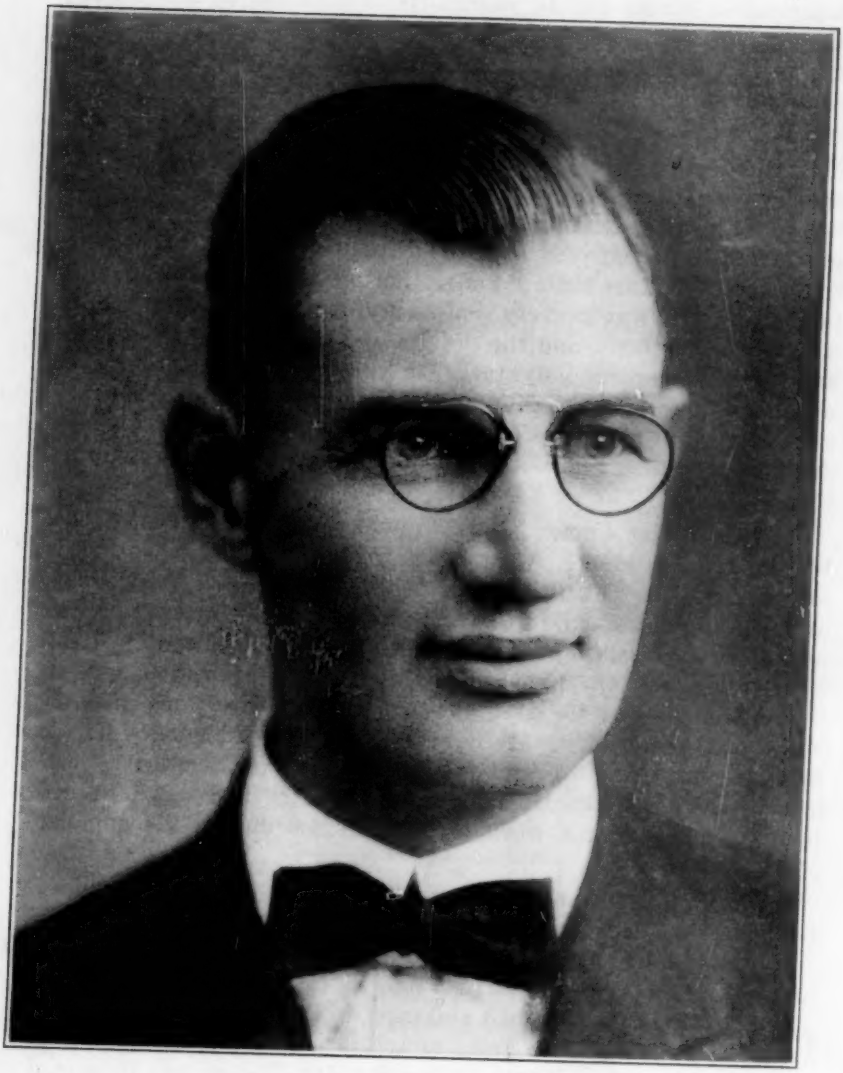
Born in Lexington, Ind., May 3, 1877, Dr. Hough was a graduate of the Indiana Veternary College, class of 1909. He had practiced at Kouts for 18 years. He is survived by his widow, three daughters, three sons, his mother and two brothers.

CHARLES HENRY STANGE

In the death of Dr. Charles H. Stange, on April 26, 1936, veterinary education in America lost an outstanding figure. Perhaps it would be no exaggeration to say that Dean Stange had a greater influence on veterinary education in this country during the past two decades than did any other member of the veterinary profession. He was in every sense a serious student of veterinary educational methods, and the results of his thorough mastery of this subject were rapidly taking form in the institution over which he presided at Ames, when death, caused by coronary thrombosis, cut short his distinguished career. He was digging dandelions in his yard when stricken and died without regaining consciousness.

Born in Cedar County, Iowa, May 21, 1880, Dr. Stange was truly a farm product. After attending the public schools of his native community, being graduated from Lowden High School, and working on a farm for several years, he decided on veterinary medicine as a career and entered Iowa State College in 1903. Four years later, he was graduated with the highest honors in the entire college. He later pursued postgraduate work in pathology and bacteriology at the University of Chicago. Like so many veterinarians of that period, Dr. Stange accepted a position in the U. S. Bureau of Animal Industry and was assigned to scabies eradication work in New Mexico during the summer of 1907.

In the fall, Dr. Stange returned to Ames to join the veterinary faculty in the capacity of assistant professor of veterinary medicine. His ability as a teacher and administrator was soon recognized by the college authorities and in 1909, about four months after Dr. J. H. McNeil had resigned as Dean of the Division of Veterinary Medicine at Ames to accept a position on the veterinary faculty at Ohio State University, Dr. Stange was promoted to the deanship, a post he continued to fill until his death. This 27 years of service made him the senior dean at Ames as well as the ranking veterinary dean in this country. Of the long list of veterinary alumni of Iowa State College, 79 per cent were graduated during the time that Dr. Stange was Dean.



CHARLES HENRY STANGE
May 21, 1880—April 26, 1936

One of the first important moves made by Dean Stange was to organize the Division of Veterinary Medicine into five departments for teaching and research in their respective fields and one department for research only, each of these having its head and a corps of assistants. Buildings were badly needed by the growing institution and the next step was to secure funds for supplying this need. The group of buildings that now houses the Division of Veterinary Medicine was the result, made possible by an appropriation of $150,000 by the Iowa legislature in 1909. The new buildings were not ready for occupancy until the spring of 1912, the year that was really a turning point for veterinary education in Iowa.

In 1911, Iowa State College required 15 units (30 credits) of high school work for entrance. This made the school the first veterinary college in America to maintain a four-year course and to require matriculants to be graduates of an accredited high school. Twenty years later, Iowa was the first veterinary college in America to require a year of pre-veterinary work.

In 1913, Dr. Stange was appointed director of the State Biological Laboratory, created by the Iowa legislature that year for the production and distribution of anti-hog cholera serum and virus. Later he was made director of the State Research Laboratory, established to conduct investigational work in animal diseases. This laboratory is now the Veterinary Research Institute.

Dr. Stange joined the A. V. M. A. in 1907 and rarely missed a meeting during his 29 years of membership. He was honored with the presidency at the convention in Montreal in 1923. He served as a member of the Executive Board for nine years and was chairman for three years of this time. He served as a member of the Committee on Publications, 1909-10; as member (1910-11 and 1912-13) and as chairman (1913-15) of the Committee on Intelligence and Education; as member of the Committee on Journal, 1915-16; as member of the Committee on Resolutions, 1917-18 and 1921-22; as member of the Committee on Budget, 1919-20, 1923-24 and 1928-30; as member of the Committee on Policy, 1928-30; and as a member of the Committee on Education since 1933. Dr. Stange was a member of the special committee appointed in 1919 to study the proposal for combining the offices of Secretary and Editor. The plan was put into operation in 1922.

The idea of organizing student chapters of the A. V. M. A. in our veterinary colleges originated with Dr. Stange. He lived to see chapters organized in every veterinary college in the

United States and in one college in Canada. At a meeting of the Iowa State College Student Chapter, on May 6, 1936, the following resolution was adopted:

WHEREAS, Dean Charles Henry Stange was in life and in memory one of the pioneers of veterinary education, a farsighted curriculum builder, a capable administrator, the guiding spirit of a great school, and an ever understanding friend of the student, and

WHEREAS, The advancement of his school and profession was always his chief interest, and

WHEREAS, This proposed modern clinic building will stand in actuality as a lasting tribute to his constant and untiring efforts to aid veterinary progress, therefore, be it

Resolved, That the Iowa State College student chapter of the American Veterinary Medical Association urge that the proposed Veterinary Clinic Building at Iowa State College be named the Charles Henry Stange Memorial Veterinary Clinic, and be it further

Resolved, That copies of this resolution be submitted to the Iowa State Board of Education, the President of Iowa State College and the heads of the several departments of the Veterinary Division.

Dr. Stange was an official delegate to the Eleventh International Veterinary Congress, held in London, in 1930. He also took a very prominent part in the Twelfth Congress, held in New York, in 1934, as a member of the Organizing Committee and as chairman of the Committee on Program.

Other organizations to which Dr. Stange belonged include: the United States Live Stock Sanitary Association, the Iowa Veterinary Medical Association, the Iowa Academy of Science, Phi Kappa Phi, Phi Zeta, Gamma Sigma Delta, Sigma Chi, Acacia, the Iowa State College 25-Year Club and the Ames Rotary Club.

In 1930, Dr. Stange was selected by the Bureau of Education of the U. S. Department of the Interior, to make a survey of and report on veterinary education in the United States. This was an extremely important assignment and, at the same time, a distinct recognition of the outstanding ability of Dr. Stange in the field of veterinary education. In 1929, Dr. Stange published "History of Veterinary Medicine at Iowa State College."

Dr. Stange's greatest hobby was working in his private machine-shop, which was said to be one of the most complete in the country. Here he turned out fine wood-carving and iron work. At the time of his death, he was constructing a grandfather's clock. He planned to make every part himself from the smallest cog to the shell. When not working in his shop, Dr. Stange usually spent his leisure hours in his garden.

Surviving Dr. Stange are his widow (née Harriet Beyer) and two daughters, Elizabeth and Jean.

LAROY L. DILLER

Dr. L. L. Diller, of Traer, Iowa, died at his home, April 25, 1936, following a protracted illness of several years. Death was attributed to an acute cardiac disease.

Born in Taylor Township, Marshall County, Iowa, May 7, 1877, of pioneer parents, Dr. Diller attended the Albion Seminary at Albion, Iowa, and then entered Iowa State College. Following his graduation from the latter institution, he entered the Chicago Veterinary College. He was graduated in 1902 and started practice at Grundy Center, Iowa, farmed for a year, and then opened an office in Marshalltown. In 1914, he moved to Traer, practicing there until 1928, when he sold his practice to Dr. D. N. Voetberg (Iowa '27), and retired on account of poor health.

He was a Mason and a member of Hesperia Lodge No. 340 and Marshall Lodge No. 108. He is survived by his widow (née Lena Simkins), one sister and two brothers, one of whom is Dr. C. R. Diller (K. C. V. C. '11), of West Hollywood, Calif.

G. B. M.

NAPOLEON L. BOILORE

Dr. N. L. Boilore, of Alpena, Mich., died at his home, April 26, 1936, following an extended illness due to a complication of diseases. Born at Saint Isadore, Quebec, January 15, 1873, he came to Michigan as a boy, first locating in Detroit. His early education was received in the Alpena public schools and he then entered the Grand Rapids Veterinary College. Following his graduation in 1905, he entered practice at Alpena. He is survived by his widow (née Rose Aris), two brothers and one sister.

HERMAN J. TIMMERMANN

Dr. Herman J. Timmermann, of Maplewood, Mo., died in Saint Mary's Hospital, Saint Louis, April 28, 1936, of peritonitis, which developed following an operation for a ruptured appendix, two weeks previously.

Born at Breese, Ill., June 8, 1877, Dr. Timmermann received a common school education, took some academic work, and studied law before entering the Kansas City Veterinary College. Following his graduation in 1901, he practiced at Breese for two years and then entered the service of the U. S. Bureau of Animal Industry and was assigned to meat inspection in Saint Louis.

Dr. Timmermann joined the A. V. M. A. in 1918. He is survived by his widow, four daughters, three brothers and three sisters.

G. H. B.

GUSTAVE BAUER, SR.

Dr. Gustave Bauer, Sr., died at his home in Belleville, Ill., April 28, 1936, following a lingering illness. He was born in Saxony, Germany, April 15, 1869, and came to this country as a child. He was a graduate of the Chicago Veterinary College, class of 1889, and was the first graduate veterinarian to locate in Belleville. He held Illinois Veterinary License 14. Surviving him are his widow (née Caroline Horttman), one son and one brother.

G. H. B.

ARTHUR C. FOOS

Dr. Arthur C. Foos, of Hazleton, Pa., died suddenly at his home on May 1, 1936. A native of Reading, Pa., he was a graduate of the Ontario Veterinary College, class of 1887, and had practiced in Hazleton since 1889. He joined the A. V. M. A. in 1909 and was a member of the Pennsylvania State Veterinary Medical Association, Hazel Lodge, No. 327, F. and A. M., Irem Temple, and the Craftsman's Club. He is survived by his widow (née Annie Roberts), one brother and one sister.

C. C. S.

ORLIN F. BUTTERFIELD

Dr. Orlin F. Butterfield, of Henry, Ill., died at his home, May 8, 1936, in his 61st year. Death followed a stroke of apoplexy. He was a graduate of the Chicago Veterinary College, class of 1896, and practiced at Libertyville, Ill., for a long time. About nine years ago, he moved to Gibson City. In 1932 he moved to Henry, Ill., after a short stay in Tiskilwa, Ill. He is survived by one daughter and one son.

Dr. Butterfield joined the A. V. M. A. in 1909.

HARRY J. FICKENSHER

Dr. Harry J. Fickensher, of Chicago, Ill., died May 10, 1936, of bronchial pneumonia, after an illness of about ten days.

Born at Yorkville, Ill., October 29, 1879, Dr. Fickensher attended local grade and high schools. He was graduated from the Chicago Veterinary College in 1911. He entered the service of the U. S. Bureau of Animal Industry, October 18, 1918, and was assigned to meat inspection at Chicago, where he remained until his death.

Dr. Fickensher joined the A. V. M. A. in 1929. He is survived by his widow.

JOHN ALBERT HOWARTH

Dr. John A. Howarth, associate in veterinary science in the University of California, located at University Farm, Davis, died May 15, 1936, from injuries received the night before, when his automobile turned over on a curve in the highway near Dixon, Calif. He did not regain consciousness. Burial was by cremation in Sacramento, Calif.

Born in Philadelphia, Pa., March 9, 1893, Dr. Howarth received a B. S. in Agriculture from Kansas State College in 1921 and his D. V. M. from the same institution in 1923. He was professor of bacteriology and pathology at Washington State College from 1923 to 1928. In the latter year he went to the University of California and devoted most of his time to the study of sheep diseases.

Dr. Howarth joined the A. V. M. A. in 1925. He was a member of the California State Veterinary Medical Association, the Society of American Bacteriologists, the Twelfth International Veterinary Congress and other scientific bodies. He was a Mason and an Elk. He is survived by his widow, one son, one daughter, his parents and two sisters.

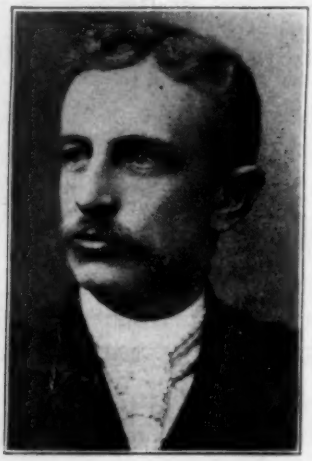
FRED LUCIUS KILBORNE

Dr. Fred L. Kilborne, of Kelloggsville, N. Y., died at his home, May 23, 1936. He had been a sufferer from heart disease for three years.

Born at Skaneateles, N. Y., October 7, 1858, he attended Union Schools of Syracuse and high school at Moravia, N. Y., before entering Cornell University in 1877. He received the degree, B. Agr., in 1881, and studied veterinary medicine under the late Dr. James Law while he was an instructor in the laboratories of physiology, zoölogy and botany at Cornell University (1880-1885). He received his veterinary degree (D. V. S.) in June, 1885. From 1885 to 1894, he was director of the Veterinary Experiment Station of the U. S. Bureau of Animal Industry, at Washington, D. C. From 1895 to 1900, he was in general practice and acted as inspector for the New York State Board of Health in connection with work on bovine tuberculosis. Since 1900, Dr. Kilborne had not been actively identified with veterinary work.

The name of Dr. Kilborne is linked with the names of Drs. Theobald Smith and Cooper Curtice in connection with the

epoch-making work done about the end of the last century, which resulted in demonstrating definitely the rôle played by the southern cattle tick in transmitting splenetic fever. This discovery, for the first time, brought to the attention of the entire scientific world, the important part played by some lower forms of animal life in transmitting diseases to man and to some of the higher animals. Without the basic facts revealed by these investigators in the field of animal pathology, much progress in the control of both human as well as animal diseases, including the eradication of the cattle tick from our southern states, might not have been possible.



DR. F. L. KILBORNE

At the Chicago meeting of the A. V. M. A. in 1933, Dr. Kilborne, along with Dr. Cooper Curtice, who had been a classmate at Cornell, received gold medals for their distinguished service in the field of veterinary medicine. On account of poor health, Dr. Kilborne was unable to receive his medal in person, but Dr. Curtice was on hand to receive his, as those who attended the meeting will recall.

Dr. Kilborne is survived by his widow (née Julia E. Tuthill), one daughter, two sons, a sister and a granddaughter.

73rd Annual Convention A. V. M. A.
Columbus, Ohio, August 11-12-13-14